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INDIVIDUALIZED SCIENCE INSTRUCTIONAL SYSTEM

BIRTH AND GROWTH



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INDIVIDUALIZED SCIENCE INSTRUCTIONAL SYSTEM

BIRTH AND GROWTH

Ginn and Company

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foreword

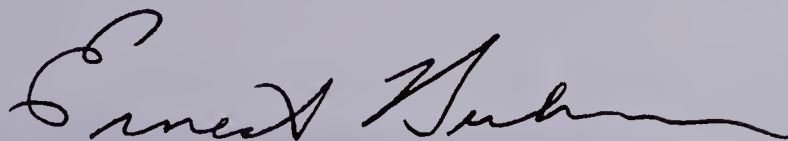
Evidence has been mounting that something is missing from secondary science teaching. More and more, students are rejecting science courses and turning to subjects that they consider to be more practical or significant. Numerous high school science teachers have concluded that what they are now teaching is appropriate for only a limited number of their students.

As their concern has mounted, many science teachers have tried to find instructional materials that encompass more appropriate content and that allow them to work individually with students who have different needs and talents. For the most part, this search has been frustrating because presently such materials are difficult, if not impossible, to find.

The Individualized Science Instructional System (ISIS) project was organized to produce an alternative for those teachers who are dissatisfied with current secondary science textbooks. Consequently, the content of the ISIS materials is unconventional as is the individualized teaching method that is built into them. In contrast with many current science texts which aim to "cover science," ISIS has tried to be selective and to limit our coverage to the topics that we judge will be most useful to today's students.

Obviously the needs and problems of individual schools and students vary widely. To accommodate the differences, ISIS decided against producing tightly structured, pre-sequenced textbooks. Instead, we are generating short, self-contained modules that cover a wide range of topics. The modules can be clustered into many types of courses, and we hope that teachers and administrators will utilize this flexibility to tailor-make curricula that are responsive to local needs and conditions.

ISIS is a cooperative effort involving many individuals and agencies. More than 75 scientists and educators have helped to generate the materials, and hundreds of teachers and thousands of students have been involved in the project's nationwide testing program. All of the ISIS endeavors have been supported by generous grants from the National Science Foundation. We hope that ISIS users will conclude that these large investments of time, money, and effort have been worthwhile.



Ernest Burkman
ISIS Project
Tallahassee, Florida

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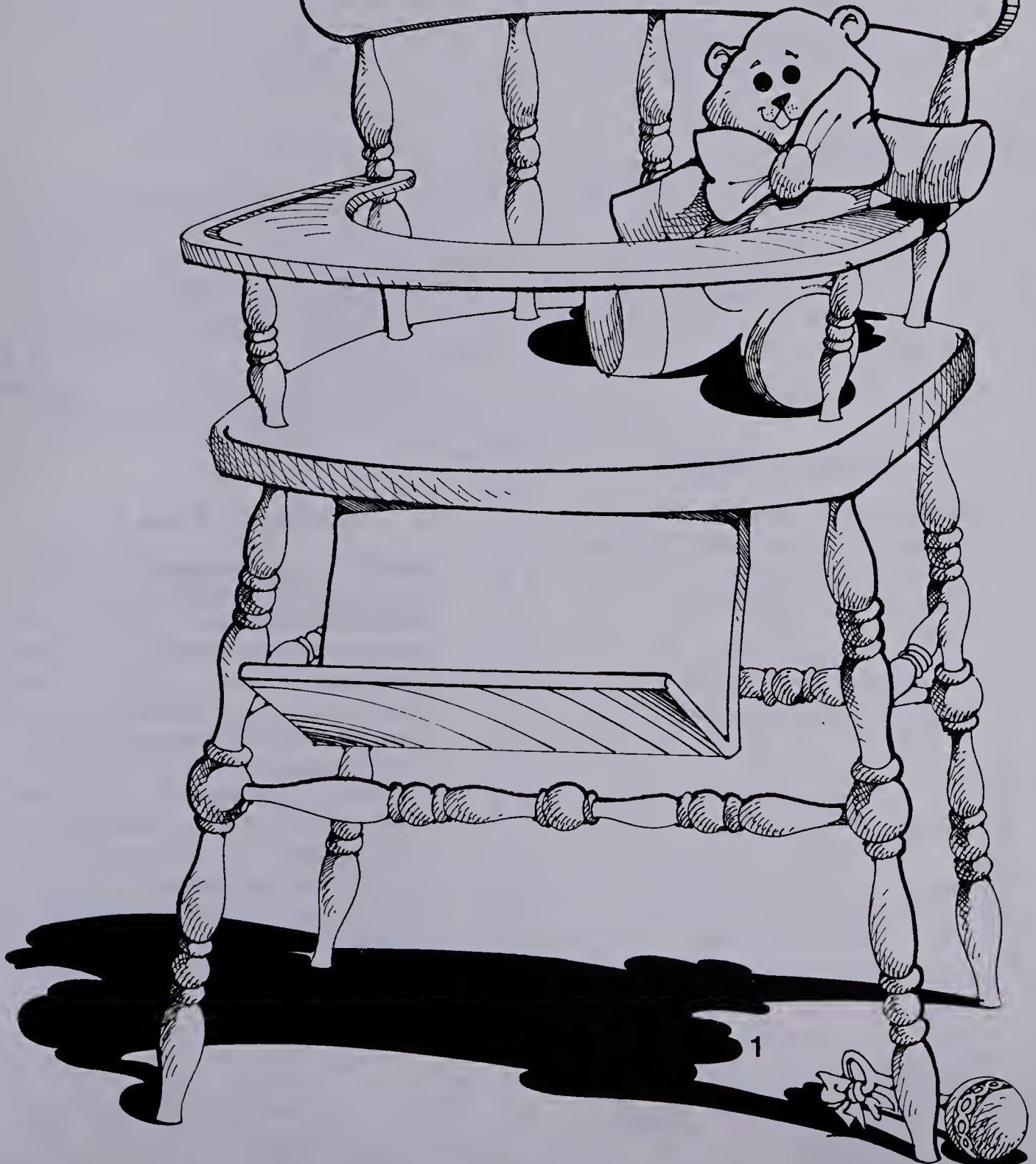
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What's It All About?

Pregnancy, birth, and growth are the topics of this mini-course. You'll learn some things about normal and abnormal pregnancies and birth. You'll also learn how a child develops and eventually grows into an adult.





Activity 1 Core Planning

You may do the core activities in any order that you want. One thing you will need to know is that a developing unborn baby is called a *fetus* [FEET-us].

Activity 3 Page 8

Objective 3-1: Describe what usually takes place during the first medical examination of a pregnant woman.

Sample Question: Which of the following does a doctor check for during the first medical exam of a pregnant woman?

- a. heartbeat of the baby
- b. sex of the baby
- c. blood type of the baby
- d. the presence of cancer

Activity 2 Page 6

Objective 2-1: Describe the common early symptoms of pregnancy.

Sample Question: Which is not an early symptom of pregnancy?

- a. nausea
- b. sudden weight gain
- c. missed menstrual period
- d. tender, enlarged breasts

Activity 4 Page 12

Objective 4-1: Distinguish beliefs about pregnancy that are true from those that are false.

Sample Question: Which of these statements are true?

- a. Medicines and other drugs that a pregnant woman takes can get into the fetus's system.
- b. Smoking cigarettes by a pregnant woman has no effect on the fetus.
- c. A pregnant woman should eat enough for two people.
- d. If a woman has German measles during pregnancy, it can cause birth defects in the fetus.

Activity 5 Page 16

Objective 5-1: Describe the typical physical and emotional changes that women show during the first, middle, and last three months of pregnancy.

Sample Question: Which things occur during the last month of most pregnancies?

- a. nausea, or morning sickness
- b. weight gain of forty pounds
- c. strong movements by the fetus
- d. frequent urination

Activity 7 Page 22

Objective 7-1: Describe what is done medically for healthy babies during the first few days after their birth.

Sample Question: Which of the following are done for babies during the first few days after their birth?

- a. PKU test given
- b. blood typed
- c. eyes treated to prevent blindness
- d. reflexes checked

Answers

2-1. b 3-1. d 4-1. a, d 5-1. c, d 6-1. a
7-1. a, c, d

Activity 6 Page 19

Objective 6-1: Describe the physical and emotional experiences of a woman during each of the four stages of labor.

Sample Question: Which of the following occurs during the final stage of labor?

- a. The placenta passes out of the woman's body.
- b. The woman becomes very irritable.
- c. The baby is born.
- d. The contractions of the uterus may feel like a backache.

Activity 8 Page 24

Objective 8-1: Describe at least two of the most frequent complications of pregnancy and birth.

Sample Question: A miscarriage is a complication of pregnancy in which

- the egg becomes attached in the fallopian tube.*
- the baby is born before the twelfth week of pregnancy.*
- the baby is born feet-first.*
- the baby is born during the ninth month of pregnancy.*

Activity 9 Page 30

Objective 9-1: Describe the purpose of using drugs during childbirth, the problems with their use, and the general view of doctors about their use.

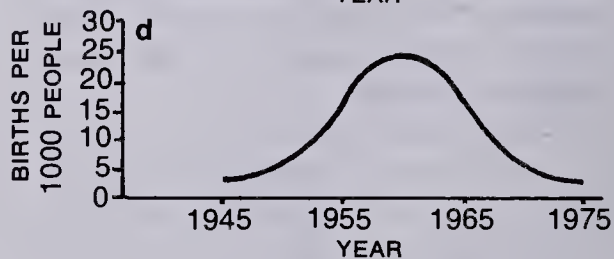
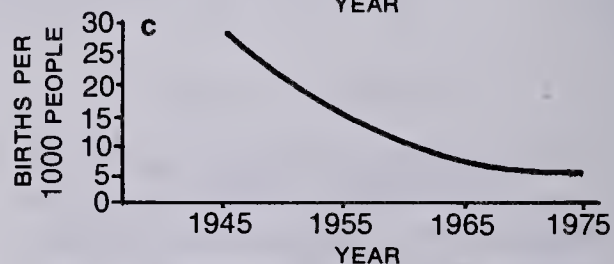
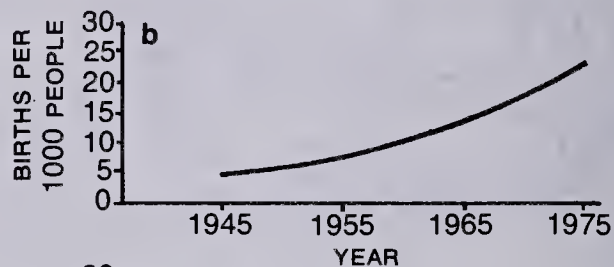
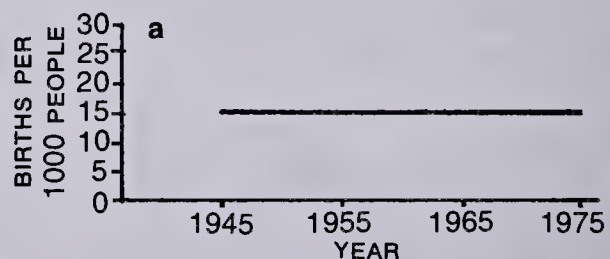
Sample Question: What is the modern view of doctors about the use of drugs during childbirth?

- Drugs don't really stop the feeling of pain.*
- The fewer drugs given, the better, because their side effects can cause unexpected problems.*
- Drugs should usually be used, but the doctor should expect certain side effects.*
- Modern drugs cause few problems during birth.*

Activity 10 Page 33

Objective 10-1: Describe recent trends in birthrates in the United States, using graphs or tables.

Sample Question: Which graph describes the birthrate in the United States in the last thirty years?



Activity 11 Page 36

Objective 11-1: Describe the major stages in children's development of language and describe Piaget's observations on the development of reasoning ability.

Sample Question: By about what age have most children learned everything about language needed to communicate?

- 16 years
- 12 years
- 6 years
- 2 years

Activity 12 Page 42

Objective 12-1: Describe children's growth in terms of changes in height, muscle coordination, and body proportions.

Sample Question: Match each age with the average height change that occurs during that age.

Age

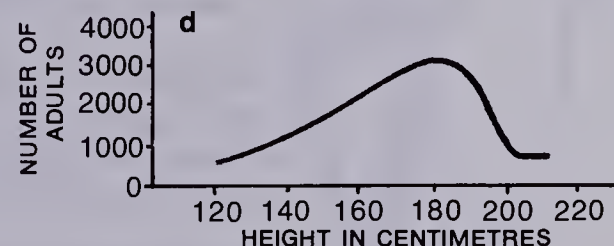
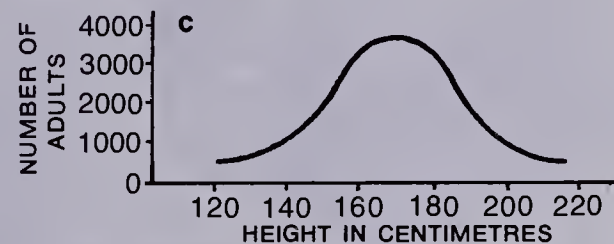
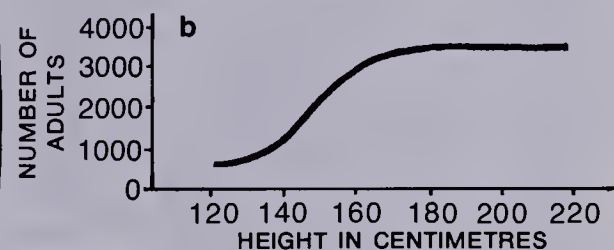
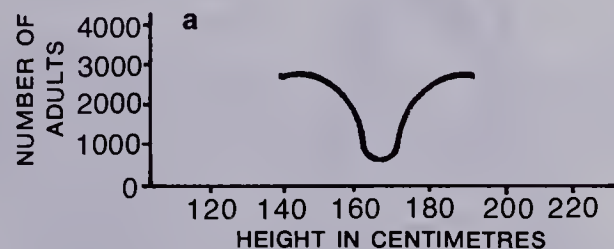
- birth to 2 years
- 5 to 11 years
- 12 to 17 years
- 18 to 25 years

Height Change

- little or no increase
- very rapid increase
- slow increase
- rapid increase for short period

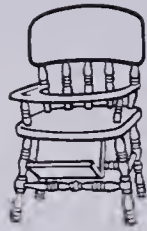
Objective 12-2: Describe a normal curve and its relationship to how heights and weights vary among adults.

Sample Question: Which graph on the right best shows how the heights of adults vary?



Answers

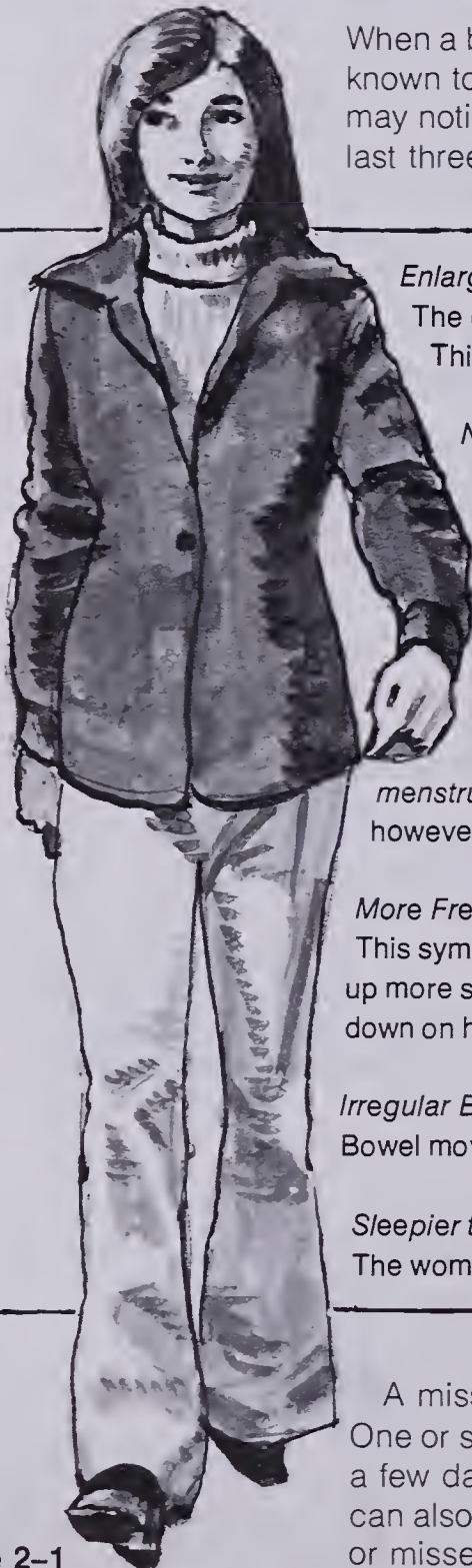
8-1. b 9-1. b 10-1. c 11-1. c 12-1. a-2, b-3, c-4, d-1 12-2. c



Activity 2

How Does a Woman Know She's Pregnant?

When a baby starts to develop inside a woman, it makes its presence known to her. Figure 2-1 lists six signs of pregnancy that a woman may notice. The first three signs are noticed by many women, but the last three are not as common.



Enlarged and Tender Breasts

The entire breast enlarges, and the nipple may get larger and darker. This is more noticeable by some women than others.

Nausea

"Morning sickness" which can occur anytime during the day or night. It can be very severe, or the woman may not have it at all. If it is going to occur, it usually starts in the first few weeks of pregnancy and goes away by about the end of the third month.

Missed Menstrual Period

Normally, a small amount of blood and tissue from the uterus is lost each month through the vaginal opening. This is called *menstruation*. During pregnancy, menstruation stops. Some women, however, have a period during early pregnancy.

More Frequent Urination

This symptom may get even more noticeable as the baby grows and takes up more space in the woman's uterus. Then the woman's uterus presses down on her bladder.

Irregular Bowel Movements

Bowel movements may become irregular, or constipation may occur.

Sleepier than Usual

The woman may feel more tired than usual or even constantly tired.

A missed menstrual period is usually the first sign of pregnancy. One or several of the other signs listed in Figure 2-1 can begin within a few days of the first missed period. Each of these signs, though, can also be caused by something other than pregnancy. Even a late or missed menstrual period can have many other causes.

Figure 2-1

There are other symptoms of pregnancy that a doctor can discover during a physical examination of a woman. The final proof of pregnancy, however, is when the woman or the doctor can feel the developing baby moving inside the uterus or when the doctor can hear the baby's heartbeat. But those two signs don't usually occur until the fourth or fifth month of pregnancy. Most women realize they are pregnant by the second or third month of pregnancy.



★ 2-1. What is usually the first and most obvious sign to a woman that she is pregnant?

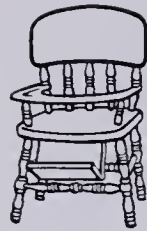
★ 2-2. List five other early symptoms of pregnancy.

- 2-3. Why is it hard to know for sure during the first weeks of pregnancy whether a woman is pregnant?

Ask your mother or a female relative, teacher, or friend who has been pregnant what early symptoms of pregnancy she had. Then answer Question 2-4.

- 2-4. What pregnancy symptoms did the woman mention?

If a woman skips a period or has some of the other symptoms of pregnancy, she should see a doctor or someone who specializes in caring for pregnant women. It is important for the woman's own health and for the baby she may be carrying.



Activity 3

What Does the Doctor Do?

A doctor who specializes in caring for pregnant women and delivering their babies is called an *obstetrician* [ob-stuh-TRISH-un]. Some of the other medical people who help pregnant women are family physicians, midwives, and public health nurses. Your local health department or hospital can tell you what maternity care is available in your community.

- 3-1. What maternity care is available for pregnant women in your community? (You may have to make a phone call or a visit to your local health department to find out.)

During the *prenatal* period, the time before a baby is born, there are many changes in the bodies of a mother and her baby. Sometimes women are afraid to go to a doctor during this period because they don't know what the doctor will do to them. They are anxious and fearful. But being pregnant is not being sick. Pregnant women are as normal and healthy as other women. A doctor makes sure the mother and baby stay in good physical health throughout the pregnancy and birth.

Whether a woman goes to her own doctor or to a public clinic, she makes an appointment for the first visit. About the same things happen in any first examination, although they may not happen in the same order. There are typically five parts in the first prenatal examination. Three of these involve getting information about the woman herself.

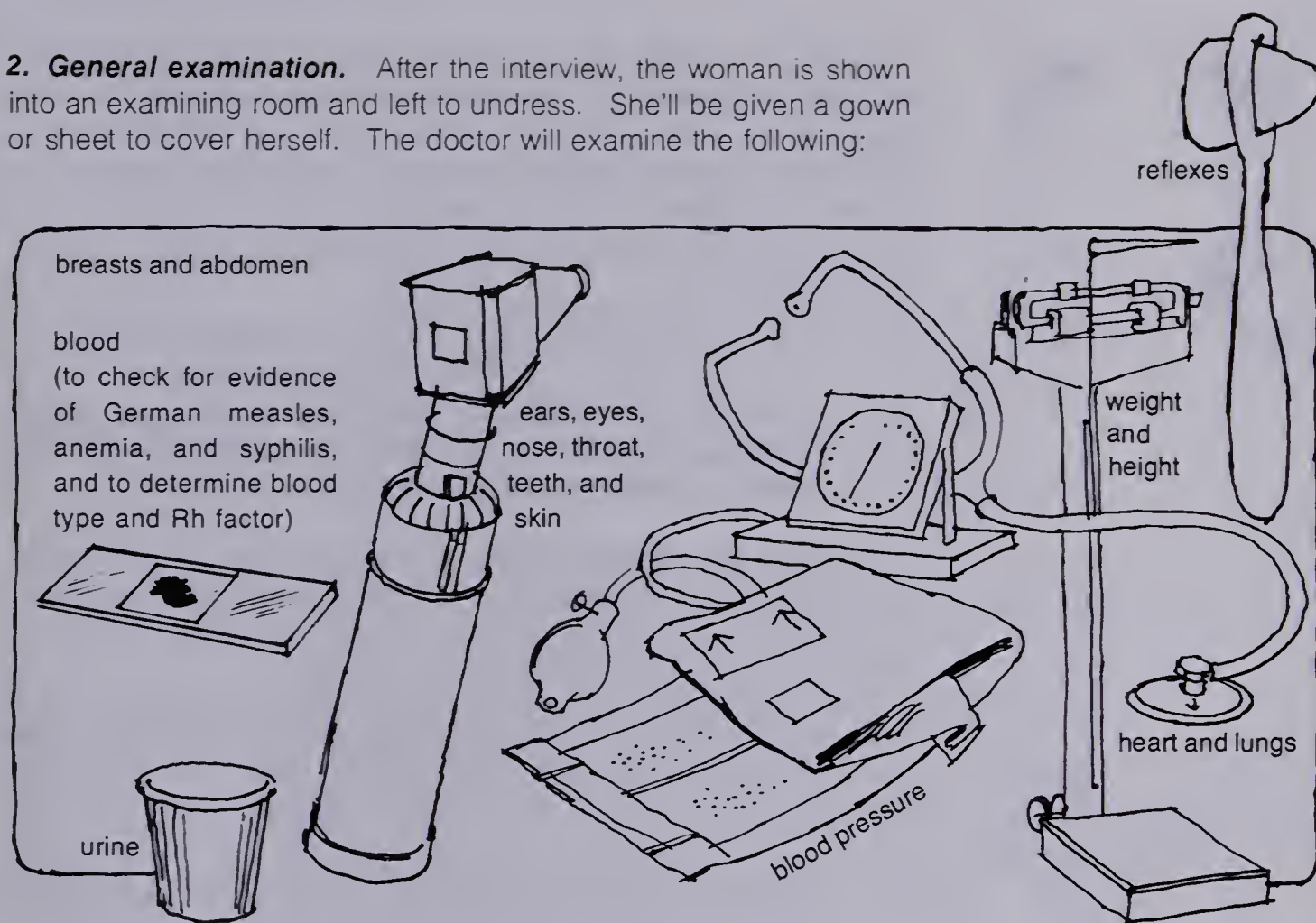
1. Interview. The woman will be asked questions about herself and her family's medical history.

This area asks for information about weight gain during previous pregnancies, time spent in labor, any anesthetics used, any complications, etc.

This area asks for background on any health problems (cancer, kidney disease, nervous disorders, birth defects, etc.) that have occurred in the patient's family.



2. General examination. After the interview, the woman is shown into an examining room and left to undress. She'll be given a gown or sheet to cover herself. The doctor will examine the following:

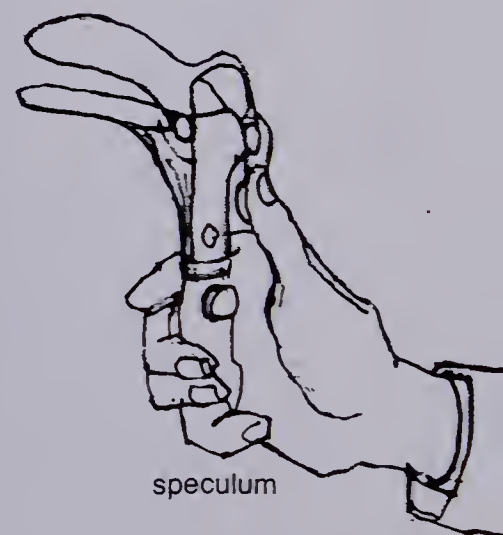


3. Pelvic examination. For a pelvic examination, the woman is asked to lie on an examining table. Her knees are raised and her feet are supported. A sheet covers everything but the pelvic area.

The doctor puts the rounded ends of a metal instrument called a *speculum* into the woman's *vagina*, which is the baby's passageway to the outside. This exam can be uncomfortable, but it is usually not painful if the woman relaxes completely. The speculum holds the vagina slightly open so that, with a light, the doctor can see the *cervix* — the opening of the uterus.

In pregnancy, the cervix changes color. This is one sign of pregnancy a doctor looks for. The doctor usually touches a cotton-tipped swab to the cervix. The few cells that are collected can be checked by the *Pap test*, a special method of staining cells, to make sure there is no cancer of the cervix.

After removing the speculum, the doctor puts two gloved fingers into the vagina and puts the palm of the other hand on top of the abdomen. By feel, the doctor can tell a lot about the size, shape, and position of the uterus. This helps the doctor to determine whether the woman is pregnant and how far along the pregnancy is. The doctor can also tell whether the pelvic area is normal.



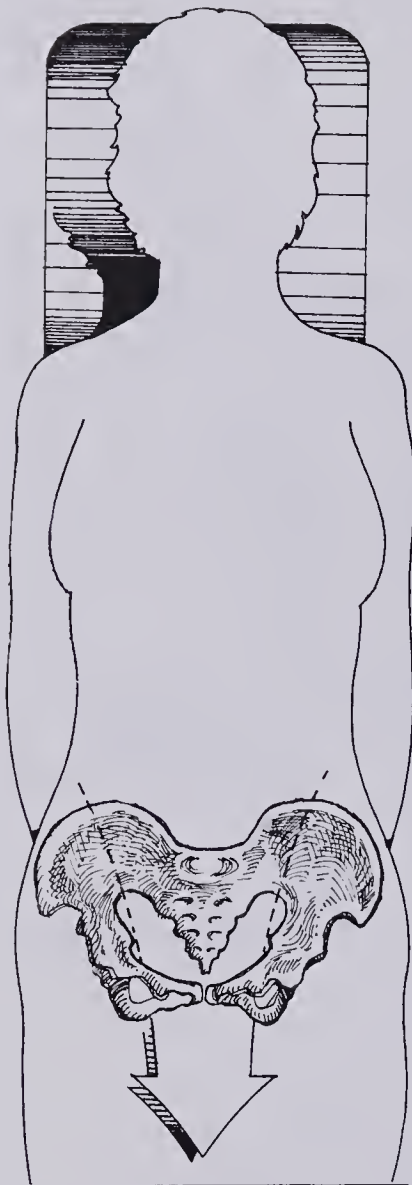


Figure 3-1

Figure 3-1 shows the circle of pelvic bones a baby will pass through during birth. Sometime during the pregnancy, perhaps in the first visit, the doctor measures the pelvic opening. If it is not large enough for a vaginal delivery, the doctor may plan a *cesarean* [si-ZAR-ee-an] delivery. This is an operation in which the doctor cuts an opening through the lower part of the abdomen and the uterus to remove the baby.

- 3-2. What does the doctor feel or look at for signs of pregnancy?

★ **3-3. During the first prenatal visit three major parts of the visit provide the doctor with information about the woman. What are the three parts?**

4. Prenatal-care advice. After the first three parts of the examination are complete the doctor or nurse will usually give the woman information about eating a balanced diet, getting enough exercise and rest, and weight control during pregnancy.

The woman should ask and get answers to her questions. She could ask where the baby should be delivered, who will deliver the baby, how long she can continue working, what nonprescription medicines she can safely take, and other such questions.

- 3-4. Write at least two questions that you think a pregnant woman should ask her doctor.

5. The baby's birth date. The doctor usually figures out an "expected date of delivery." The doctor, when figuring the date, is not a magician or a fortune-teller. You could do it, using some simple biological facts and a calendar.

Here's the average timing of pregnancy.

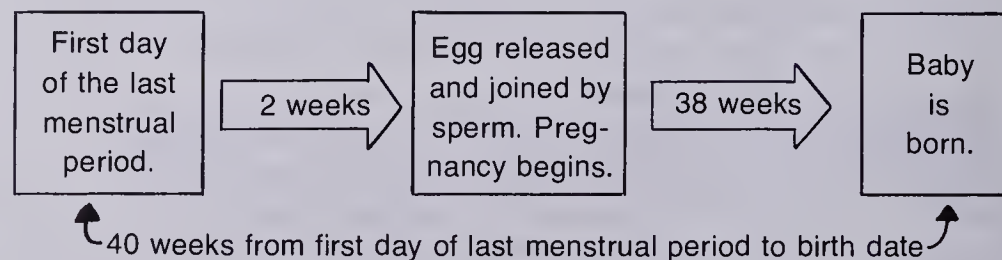


Figure 3-2

Although the numbers in Figure 3-2 can vary somewhat, it is assumed that the egg was released and joined by a sperm exactly on the fourteenth day of the last menstrual cycle. Also, it is assumed that the baby will be born exactly 38 weeks later.

A doctor can then make a simple count based on those assumptions. If the woman remembers when the first day of her last menstrual period was, the doctor counts ahead 40 weeks from that day.

Usually, doctors don't bother to count 40 weeks. Here's the method many of them use.

Find Day 1 Add 1 Year Add 7 Days Count Back 3 Months	Example: Day 1 of last menstrual cycle: April 3, 1976 Add 1 year: April 3, 1977 Add 7 days: April 10, 1977 Count back 3 months: January 10, 1977	
---	---	--

- 3 – 5. Using one of the methods just described, calculate the expected delivery dates for the women in Figure 3–3.

EXPECTED DELIVERY DATE

NAME	FIRST DAY OF LAST MENSTRUAL PERIOD	EXPECTED DATE OF DELIVERY
Iris Brown	February 12, 1977	(?)
Jane Bazelewski	November 8, 1976	(?)
Ann Iguchi	May 28, 1977	(?)

Figure 3–3

Remember that what you have learned to calculate is an *expected* date of delivery. Actually, only one baby in twelve is born exactly on the day the doctor calculates. But most babies are born within two weeks before or after that date.

- 3 – 6. There are at least two possible errors in the assumptions the doctor makes. What might cause the calculated expected date of delivery to be wrong?
- ★ 3–7. List four subjects that would likely be discussed with a pregnant woman during her first prenatal visit.
- ★ 3–8. What information about the baby will the doctor probably be able to give the expectant mother during her first prenatal visit?



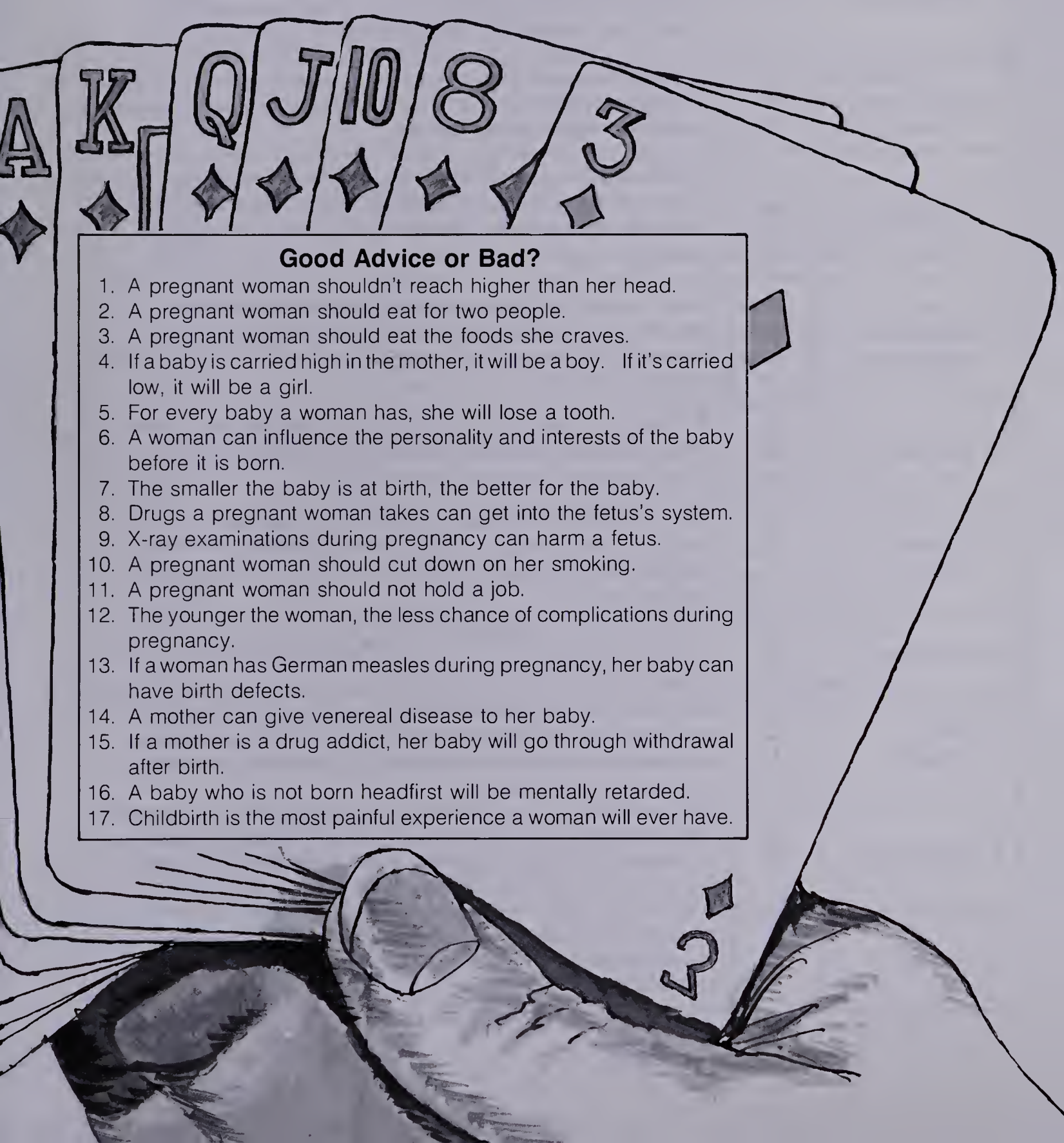
Activity 4

Good Advice or Bad?

Most people think they know a lot about pregnancy and birth. After all, every adult has known someone who has had a baby. People who think they know all about it often give a lot of “free advice” to women who are pregnant. See if you know which advice is correct according to scientific studies.



★ 4-1. Read each of the following beliefs. On a sheet of paper, write whether you think each belief is true or false. When you've finished, use the table on pages 14 and 15 to see how well you did.



Good Advice or Bad?

1. A pregnant woman shouldn't reach higher than her head.
2. A pregnant woman should eat for two people.
3. A pregnant woman should eat the foods she craves.
4. If a baby is carried high in the mother, it will be a boy. If it's carried low, it will be a girl.
5. For every baby a woman has, she will lose a tooth.
6. A woman can influence the personality and interests of the baby before it is born.
7. The smaller the baby is at birth, the better for the baby.
8. Drugs a pregnant woman takes can get into the fetus's system.
9. X-ray examinations during pregnancy can harm a fetus.
10. A pregnant woman should cut down on her smoking.
11. A pregnant woman should not hold a job.
12. The younger the woman, the less chance of complications during pregnancy.
13. If a woman has German measles during pregnancy, her baby can have birth defects.
14. A mother can give venereal disease to her baby.
15. If a mother is a drug addict, her baby will go through withdrawal after birth.
16. A baby who is not born headfirst will be mentally retarded.
17. Childbirth is the most painful experience a woman will ever have.

ADVICE EXPLAINED

ADVICE	ANSWER	EXPLANATION
1. Reaching high	F	Unless a doctor tells her otherwise, any exercise that a woman usually does can be done during pregnancy. She should avoid anything that causes discomfort. Many women do special exercises during pregnancy to strengthen muscles that will be used in delivering the baby.
2. Eating for two	F	A pregnant woman should eat a variety of nutritious foods. But a fetus (unborn baby) does not need as much food as an adult. Most pregnant women gain about 20 to 25 pounds.
3. Craving foods	F	A pregnant woman should not eat fatty, salty, or very sweet foods. Cravings for certain foods are sometimes, but not always, a part of pregnancy and may mean an improper diet. A doctor can suggest a proper diet.
4. Carrying baby high or low	F	There is no safe, reliable way to predict the sex of a fetus. Sex is determined by the type of sperm that fertilizes the egg. If the sperm carries a Y chromosome, the child will be male; an X chromosome, the child will be female.
5. Losing teeth	F	If a pregnant woman gets the proper amount of calcium from milk and other sources, her teeth should remain healthy throughout pregnancy. She should continue regular dental checkups.
6. Influencing the baby	F	What a pregnant woman experiences, thinks, or feels doesn't affect the fetus. A woman cannot produce a musically talented child by thinking about music. A woman who has seen something horrible has not damaged her child.
7. Small babies	F	Small babies are more likely to have complications after birth than babies of normal weight.
8. Taking medicines	T	Many drugs can pass from a woman to a fetus. Only a few drugs have been definitely linked to birth defects. But all medicines are considered dangerous to the fetus. Pregnant women should not even take aspirin without their doctor's approval.
9. Having X rays	T	X rays, especially early in pregnancy, can cause damage to a fetus. A woman should always tell a doctor or dentist if she is pregnant. X rays will not be taken unless absolutely necessary.
10. Smoking	T	Women who smoke have premature babies twice as often as women who do not smoke. Often, women who smoke have babies that are smaller at birth.

ADVICE EXPLAINED

ADVICE	ANSWER	EXPLANATION
11. Working	F	How long a pregnant woman keeps working depends on how she feels and what kind of work she does. Often, women work into the eighth month of pregnancy.
12. Being young	F	Ages twenty to thirty are usually considered best for child bearing. Women are more likely to need special care if they are younger than twenty or older than thirty when they have their first child. Of course, many younger or older women have perfectly normal pregnancies.
13. Having German measles	T	German measles, sometimes called "three-day measles," may not be noticed by a pregnant woman. But it can badly damage a fetus. The most dangerous time to have German measles is during the first three months of pregnancy.
14. Having venereal disease	T	Syphilis and gonorrhea germs can pass from a woman to a fetus. If untreated, the fetus could be seriously affected. Pregnant women are given a blood test to see whether they have syphilis. Newborn babies have drops put into their eyes to kill gonorrhea germs.
15. Being a drug addict	T	The newborn baby will have to go through withdrawal of the drug its mother was using. Withdrawal can cause the baby's death, especially since it is probably smaller and weighs less than a normal baby.
16. Delivering headfirst	F	Any position other than headfirst is considered a complication of birth. But most babies who are born feet first or buttocks first will be normal. The doctor has to make sure, though, that the umbilical cord is not pinched during birth. That can cut off the baby's oxygen supply.
17. Experiencing pain	F	Childbirth can be very painful if there are complications. But most women can go through labor and delivery with little or no use of painkillers. However, drugs are available if needed.

A pregnant woman should always follow the advice of her doctor even if it is different from that given in the explanations in the table. She may have an unusual problem that prevents her from following normal procedures.

- 4 – 2. Which three false beliefs about pregnancy were the most surprising to you?
- 4 – 3. Which three true beliefs most surprised you?

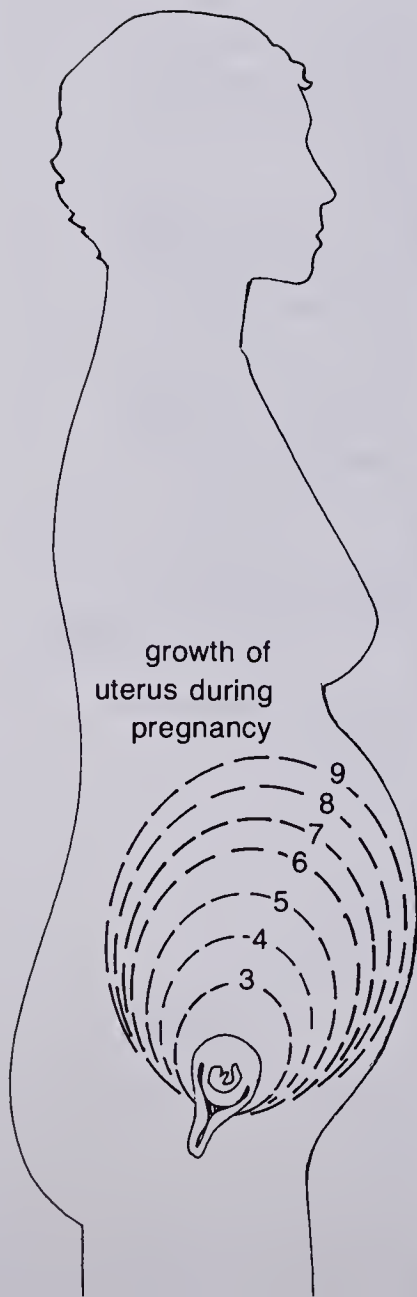


Activity 5

A Normal Pregnancy

In this activity, you will need a cassette player and the tape for *Birth and Growth*. Find the band for Activity 5. As you listen, look at the illustrations on pages 16, 17, and 18. You may want to stop the tape if you answer the questions as you go along. Begin listening now.

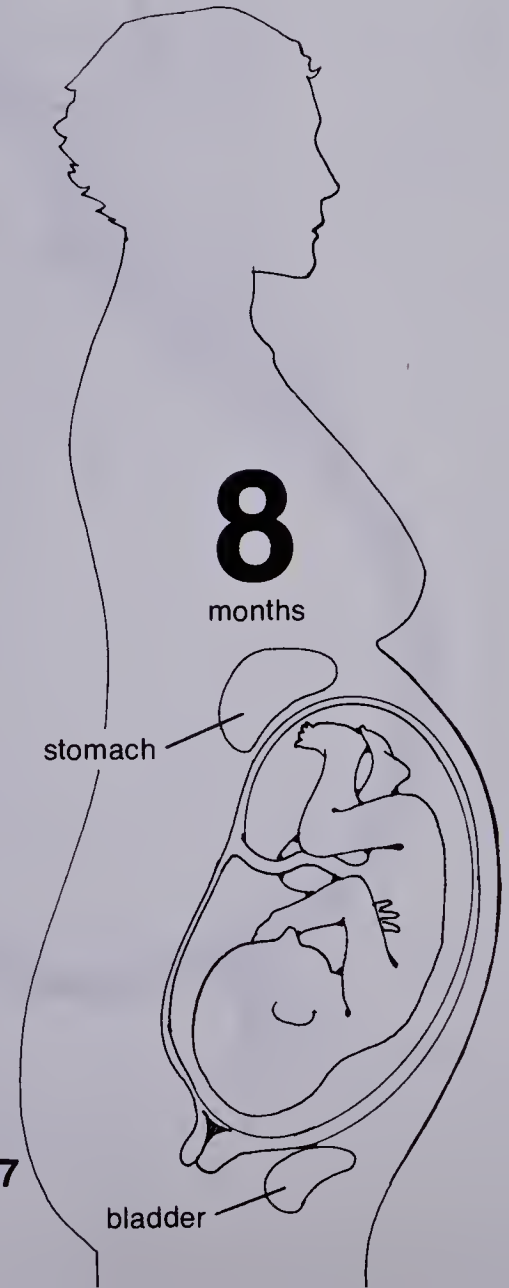
- 5 – 1. Why is it important for a pregnant woman to take iron tablets?
- 5 – 2. What is one possible reason why a pregnant woman needs to urinate frequently?
- 5 – 3. About how much weight should a pregnant woman gain?



- 5 – 4. What is one possible explanation for a pregnant woman becoming more sensitive emotionally?

★ 5–5. When do each of the following physical or emotional changes *first* occur — early in pregnancy, in the middle of pregnancy, or late in pregnancy?

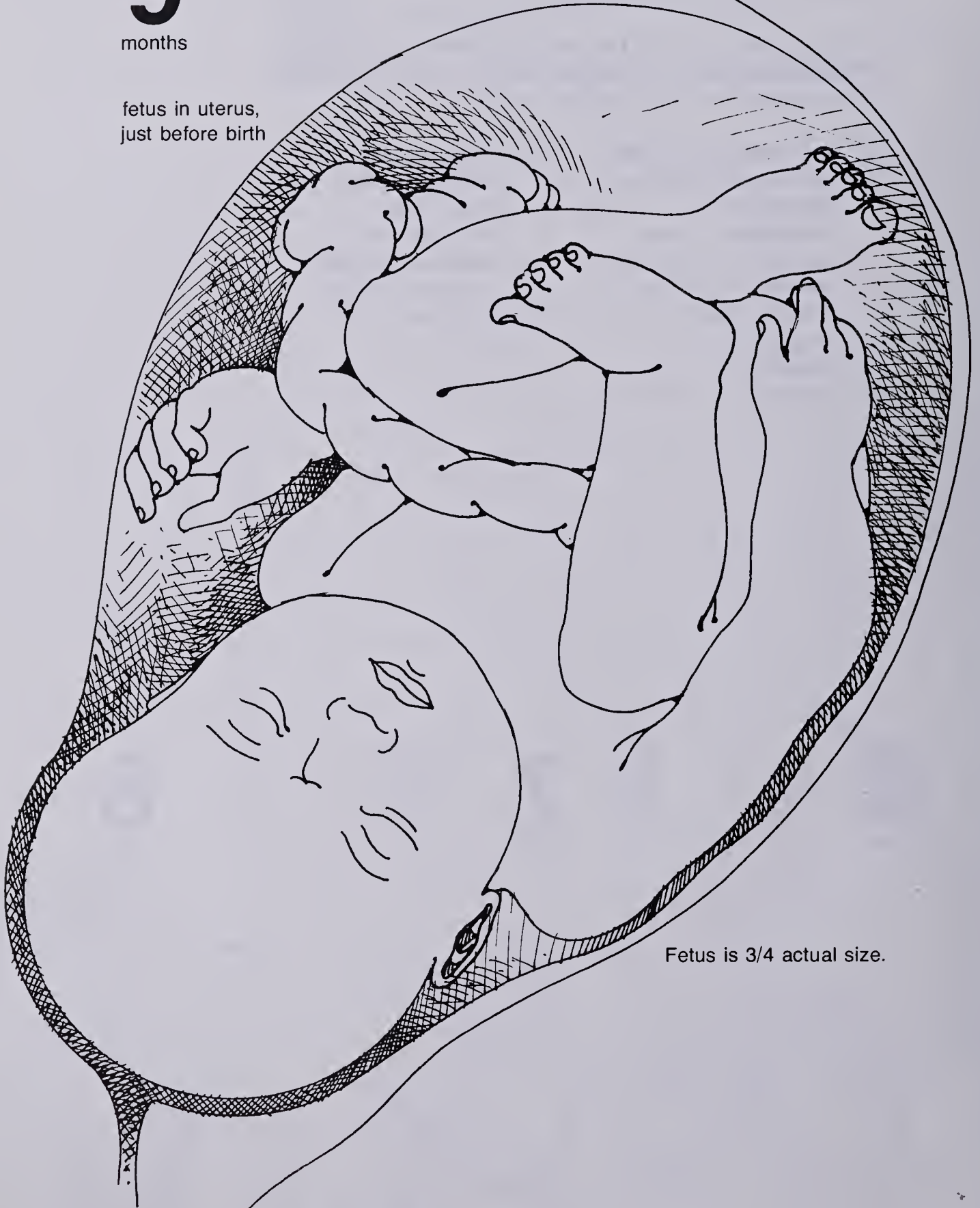
- | | |
|---------------------------------------|-------------------------------|
| a. abdomen gets larger | h. ankles swell |
| b. breasts get larger and more tender | i. more sensitive emotionally |
| c. movement of fetus can be felt | j. awkward feeling |
| d. appetite increases | k. most weight gain |
| e. urination more frequent | l. cannot eat much at a time |
| f. anemia | |
| g. nausea | |



9

months

fetus in uterus,
just before birth



Fetus is 3/4 actual size.

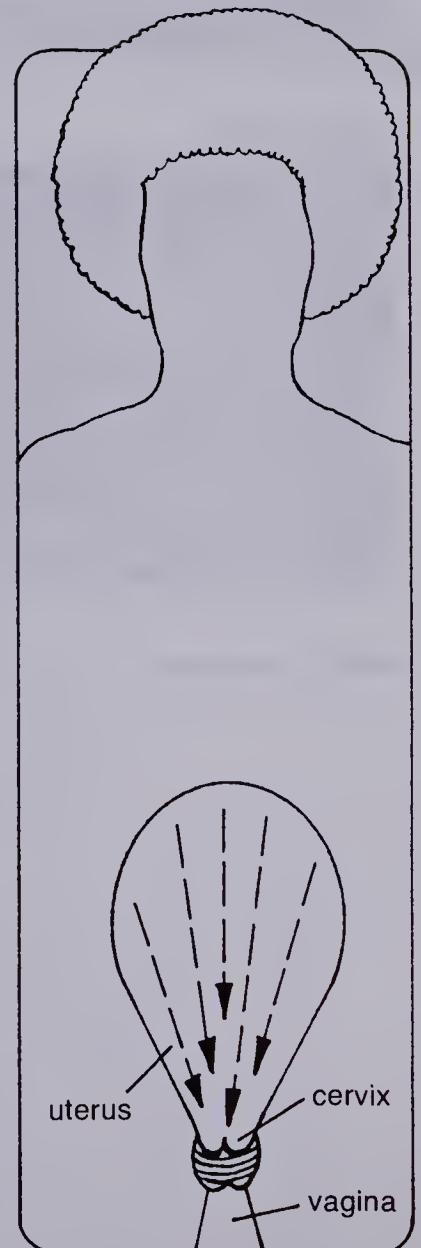


Activity 6

A Normal Childbirth

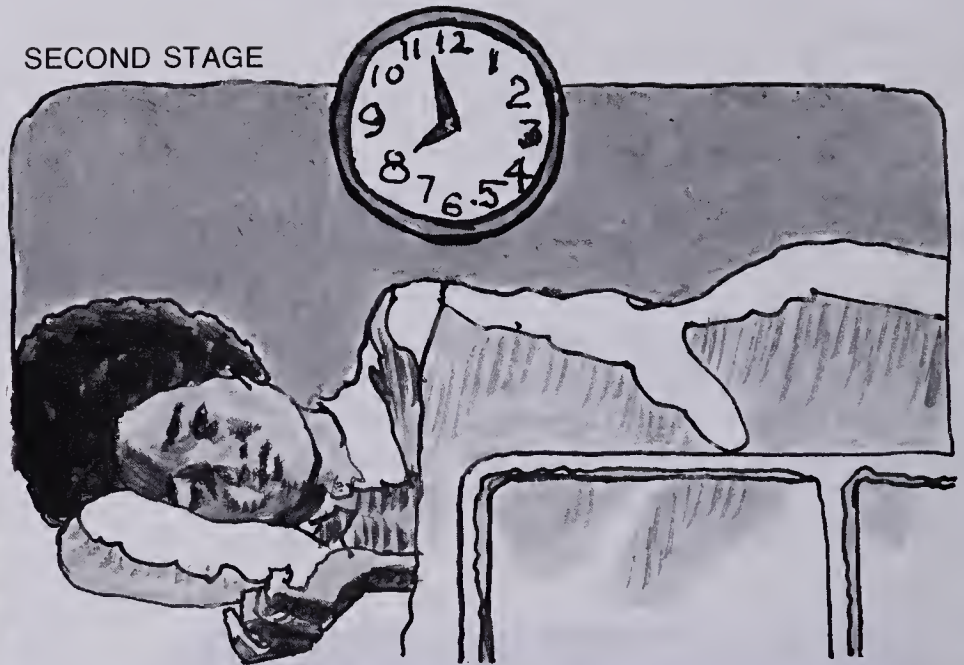
In this activity you will listen to a tape and look at a series of illustrations. You will need a cassette player and the tape for *Birth and Growth*. Find the band for Activity 6. When you begin the tape, look at the first illustration. When you have finished the tape, you should be able to answer the questions for this activity. Begin listening when you are ready.

FIRST STAGE





SECOND STAGE

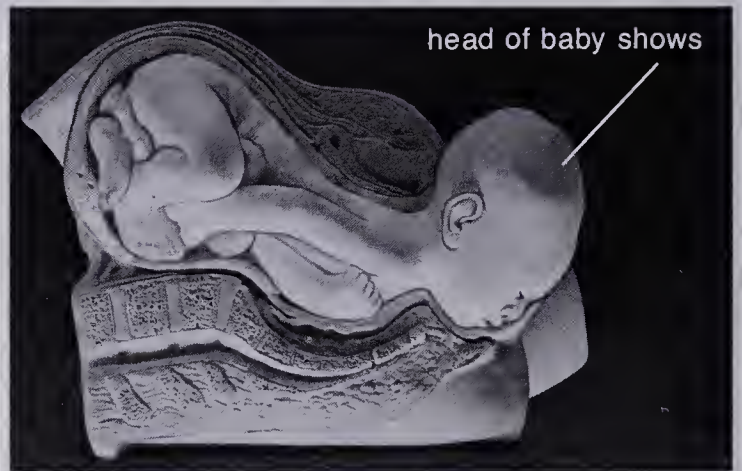


THIRD STAGE

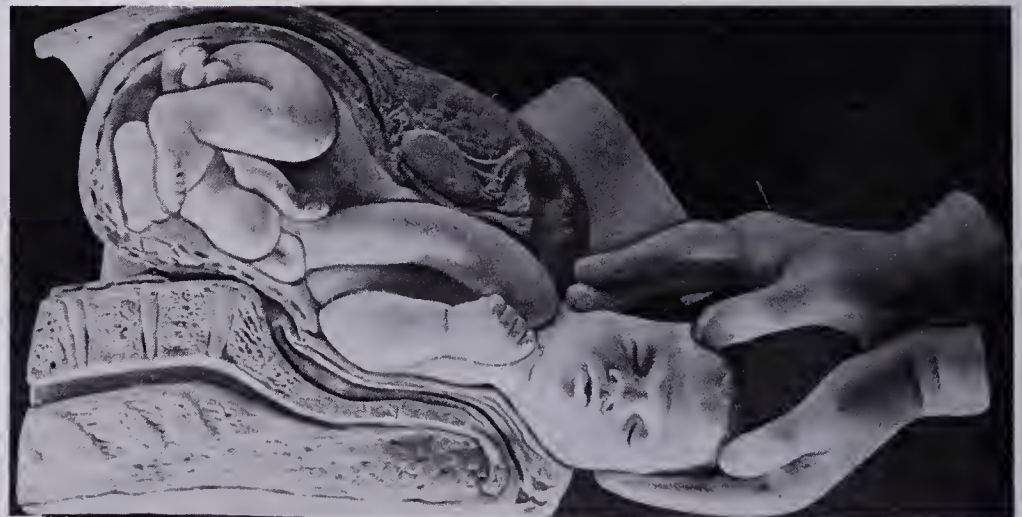


head of baby turned

cervix

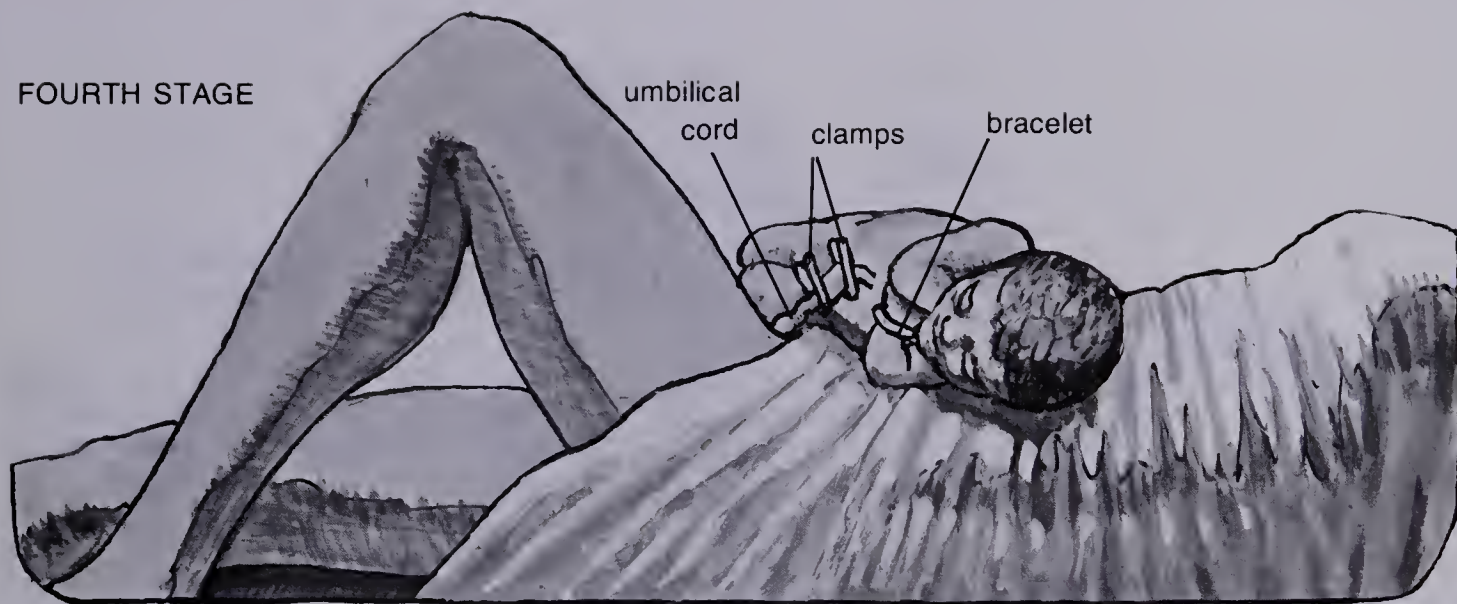


head of baby shows



- 6-1 During labor, what is the function of contractions of the uterus?
- ★ 6-2. In what stage of labor is the cervix fully open?

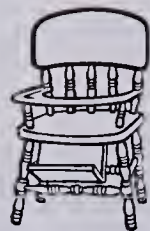
FOURTH STAGE



- 6–3. Normally, how many seconds do the longest contractions last?
- 6–4. During delivery, what can the doctor do to enlarge the vaginal opening?
- ★ 6–5. **Match each stage of labor with the physical or emotional change(s) that first occur in that stage.**

Stage	Change
a. first stage	1. episiotomy
b. second stage	2. bag of waters breaks
c. third stage	3. delivery of afterbirth
d. fourth stage	4. desire to push
	5. delivery of baby's head
	6. contractions 20 minutes apart

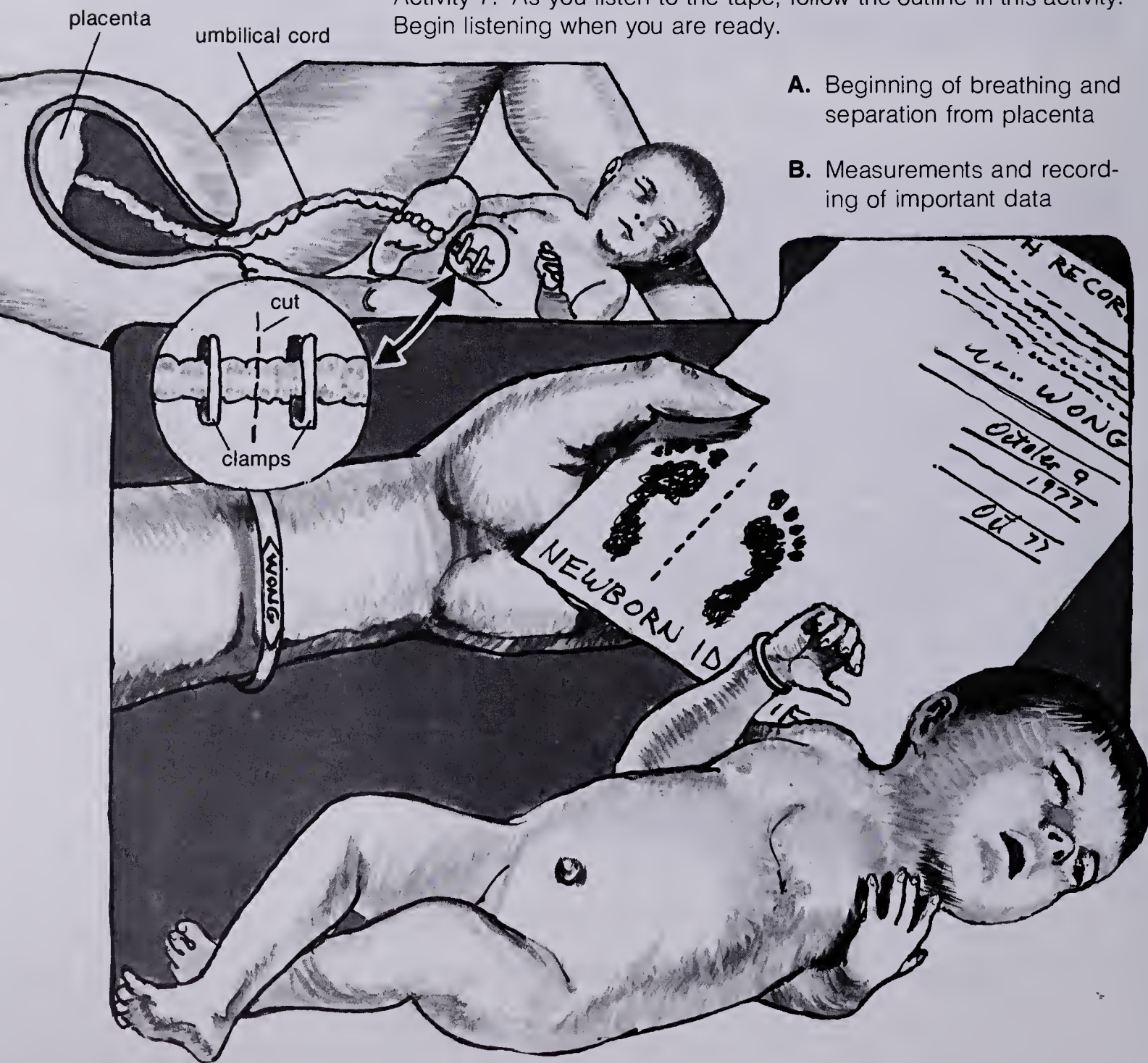
- 6–6. Which stage of labor is likely to be the most painful?
- 6–7. From the beginning of labor until delivery of the baby, how long does a first birth usually take?
- 6–8. What are two signs, in addition to contractions, that real labor has begun?
- 6–9. What are “labor pains”?
- 6–10. What happens to the length and strength of contractions and to the time between them as labor progresses?
- 6–11. When does a woman begin to produce milk in her breasts?



Activity 7

The Newborn Baby

You will listen to a tape in this activity. On the tape, a doctor, a nurse, and a new mother and father talk over what happens to a baby after it is born and before it goes home from the hospital. You will need a cassette player and the tape for *Birth and Growth*. Find the band for Activity 7. As you listen to the tape, follow the outline in this activity. Begin listening when you are ready.



- A. Beginning of breathing and separation from placenta
- B. Measurements and recording of important data

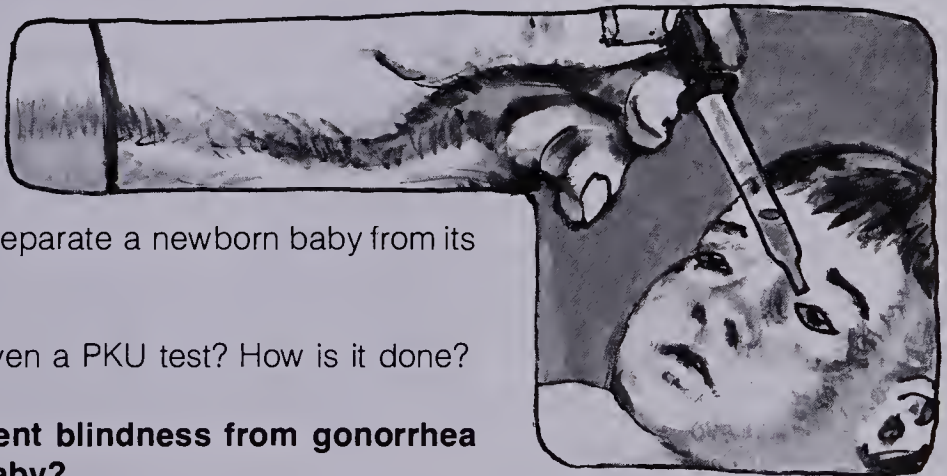
C. Examination of infant

1. breathing
2. obvious birth defects
3. skin
4. internal organs
5. heartbeat
6. reflexes



D. Medical treatments and tests

1. drops in eyes
2. PKU test
3. circumcision of males



- 7 – 1. What is done to physically separate a newborn baby from its mother?
- 7 – 2. Why is a newborn baby given a PKU test? How is it done?
- ★ 7–3. **How does a doctor prevent blindness from gonorrhea infection in a newborn baby?**
- ★ 7–4. **List at least three observations doctors usually make of newborn babies.**
- 7 – 5. In the first few days of a baby's life, how are its heart sounds different from what they will be when the baby is older?
- 7 – 6. Name three reflexes that newborn babies should have.



Activity 8 Complications

Most pregnancies and deliveries are normal. Occasionally, though, something unusual occurs during pregnancy or birth that causes complications. That is one reason for having medical care during pregnancy and childbirth.

Look at Figure 8–1. The chart shows how often some complications occur.

FREQUENCY OF COMPLICATIONS

COMPLICATION	FREQUENCY
Fertilized egg attached in wrong place	Less than 10% of all pregnancies
Miscarriage	About 10% of all pregnancies
Toxemia	Usually about 1% of all pregnancies, but higher among women with poor nutrition and no prenatal care
Anemia	Almost all pregnancies
German measles	Probably less than 1% of all pregnancies
Premature birth	About 5% of all pregnancies
Lack of oxygen	Rare in hospital deliveries
Breech presentation	About 4% of all pregnancies

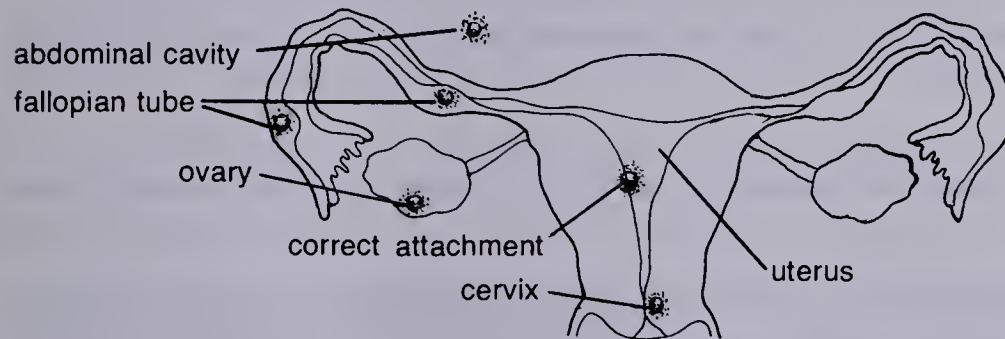
Figure 8–1

- 8 – 1. According to Figure 8–1, what is the most frequent complication of pregnancy?

The rest of this activity will tell you more about the complications of pregnancy and birth that are listed in the table. Through questions and answers, you'll learn what happens to cause the complications (if the causes are known) and what can be done by way of prevention or treatment.

Fertilized Egg Attached in Wrong Place

An egg is almost always fertilized — joined by a sperm — in the fallopian tubes of a woman. Usually the fertilized egg continues to travel down the tube and attaches to the uterine wall. As the fetus grows, the uterus is the only place that can expand without bursting.



QUESTION: In what wrong places can a fertilized egg attach?

ANSWER: In the fallopian tube, ovary, abdominal cavity, or cervix.

QUESTION: What are the symptoms?

ANSWER: Pain in abdomen; sometimes late or missed periods.

QUESTION: What can be done?

ANSWER: Operation to remove misplaced developing egg.

Miscarriage

The too-early birth of a baby, usually before twelve weeks, is called a *miscarriage*.

QUESTION: What are the symptoms?

ANSWER: Cramps in the abdomen and bleeding from the vagina.

QUESTION: When do miscarriages occur?

ANSWER: Usually in the second or third month of pregnancy.

QUESTION: Why do miscarriages occur?

ANSWER: Most commonly because something is wrong with the developing fetus.

★ 8–2. **Where is the correct place for attachment of a fertilized egg?**

- 8 – 3. During what period of pregnancy does a miscarriage usually occur?

Toxemia

Toxemia is a dangerous condition involving high blood pressure and protein in the urine. It can occur near the end of pregnancy and can be fatal to the fetus if not treated.

QUESTION: Who can get toxemia?

ANSWER: Any pregnant woman, but it is more common in first pregnancies and in women under sixteen years or over thirty years old.

QUESTION: What are the symptoms?

ANSWER: Swelling of face, hands, feet; rapid weight gain; headaches; high blood pressure; protein in urine; abdominal pain; nausea.

QUESTION: What causes toxemia?

ANSWER: No one knows, but symptoms usually disappear after the birth of the baby.

QUESTION: What can be done?

ANSWER: High protein diet, bed rest, less salt in food, and starting labor as soon as the fetus is developed enough.



Anemia

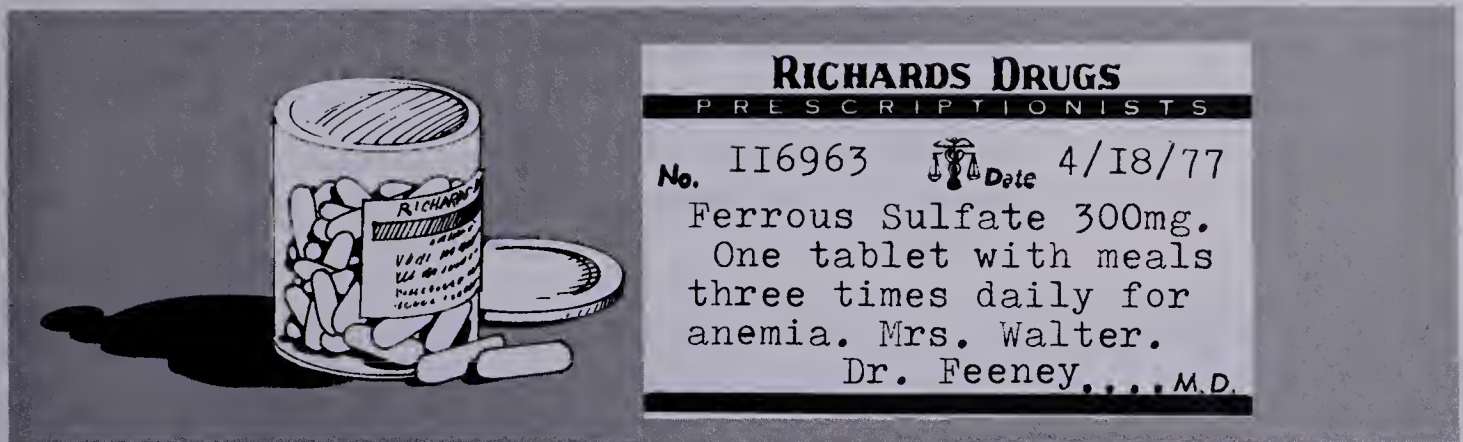
When there are too few red blood cells or not enough hemoglobin in the red blood cells to carry needed oxygen, a condition called *anemia* exists. This is likely to be harmful to both mother and fetus.

QUESTION: What are the symptoms?

ANSWER: Sleepiness, paleness, and weakness. A blood test can identify it.

QUESTION: What can be done?

ANSWER: Iron pills and a diet high in foods containing iron are prescribed.



- 8-4. How might a pregnant woman know if she has developed toxemia?

★ 8-5. What is anemia and how is it treated?

German Measles

German measles is a short-lasting (three days) form of measles, sometimes called *rubella* [roo-BELL-a]. Once you have had rubella, you aren't likely to get it again.

QUESTION: Why is German measles dangerous?

ANSWER: It can spread to a developing fetus and cause blindness, deafness, heart defects, and mental retardation, especially during first three months of pregnancy.

QUESTION: What can be done?

ANSWER: A woman should have a blood test before getting pregnant, to see if she has had rubella. If she hasn't had it, she should be vaccinated at least three months before pregnancy so she won't get it.

Premature Birth

In a premature birth a baby is born before it has developed enough to live without special hospital care. It usually weighs less than 5 pounds (2.3 kilograms) and generally is born in the seventh or eighth month of a pregnancy.

QUESTION: What problems does a premature baby have?

ANSWER: Instead of staying constant, the baby's body temperature changes with room temperature; the baby may not be strong enough to suck; its breathing system may fail.

QUESTION: What causes premature births?

ANSWER: The exact cause is unknown, but a mother's illness, smoking, infections, alcohol, and toxemia are often associated.

QUESTION: What can be done?

ANSWER: The baby is kept in a closed container called an *incubator* to protect it from germs and keep its temperature just right — about 37°C.



- 8 – 6. Why is German measles so dangerous during pregnancy?
- 8 – 7. What can a pregnant woman do to reduce the risk of a premature delivery?

Lack of Oxygen to Baby

A lack of oxygen results when the supply of oxygen needed by all the baby's cells is cut off or reduced.

QUESTION: What causes lack of oxygen?

ANSWER: Mislocated placenta; pressure on the umbilical cord during delivery; separation of placenta from uterus too early in labor; too many drugs in the mother, which slow down breathing in the baby.

QUESTION: What are the dangers?

ANSWER: Lack of oxygen for more than a few minutes causes brain damage.

Breech Presentation

Sometimes babies are born bottom down or feet first, in what is called *breech presentation*. This is quite dangerous because the baby might take its first breath when its bottom is born and before its head emerges. Then the baby could suffocate.



QUESTION: What can be done?

ANSWER: Instruments can be used to help deliver the baby's head, or a *cesarean delivery* can be done.

QUESTION: What is a cesarean delivery?

ANSWER: An opening is cut in the woman's abdomen and uterine wall to remove the baby. This procedure is used when the birth passageway is too small or when toxemia or other urgent conditions demand a fast delivery.

- 8 – 8. What is “lack of oxygen to the baby”?

★ 8–9. What are the characteristics of a breech presentation?



Activity 9

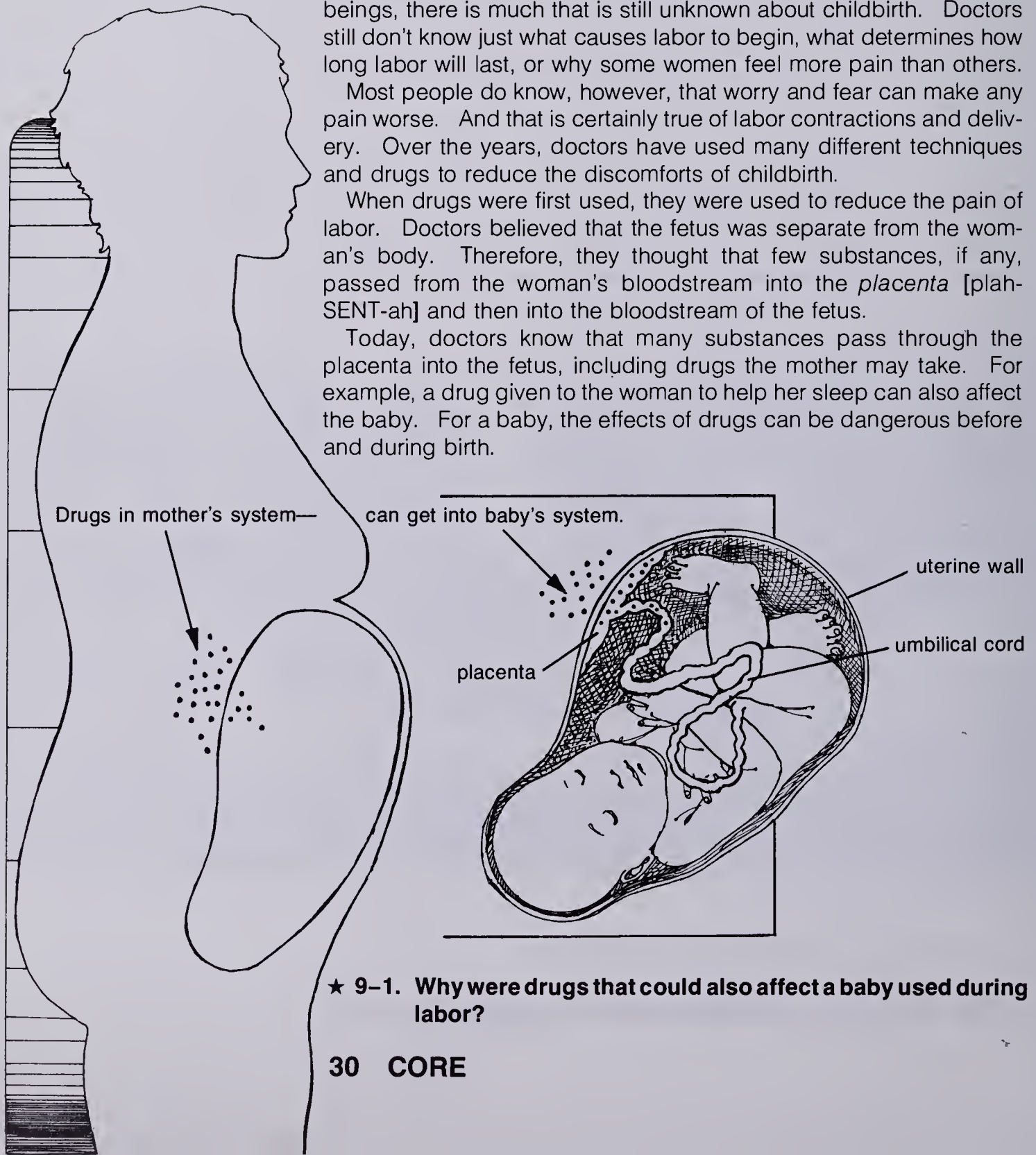
Drugs and Childbirth

Although babies have been born since the beginning of human beings, there is much that is still unknown about childbirth. Doctors still don't know just what causes labor to begin, what determines how long labor will last, or why some women feel more pain than others.

Most people do know, however, that worry and fear can make any pain worse. And that is certainly true of labor contractions and delivery. Over the years, doctors have used many different techniques and drugs to reduce the discomforts of childbirth.

When drugs were first used, they were used to reduce the pain of labor. Doctors believed that the fetus was separate from the woman's body. Therefore, they thought that few substances, if any, passed from the woman's bloodstream into the *placenta* [plah-SENT-ah] and then into the bloodstream of the fetus.

Today, doctors know that many substances pass through the placenta into the fetus, including drugs the mother may take. For example, a drug given to the woman to help her sleep can also affect the baby. For a baby, the effects of drugs can be dangerous before and during birth.



★ 9-1. Why were drugs that could also affect a baby used during labor?

Actually, drugs given during childbirth — or any other time — often have drawbacks. Their effects are not always predictable. A drug might lessen the pain of labor for the mother, but it might cause her to become nauseous or it might slow down the baby's breathing at birth. Figure 9–1 shows some side effects of drugs used during labor. When drugs slow down the baby's normal activity, the baby may have difficulty adjusting to conditions outside the mother's body.

DRUGS USED DURING LABOR

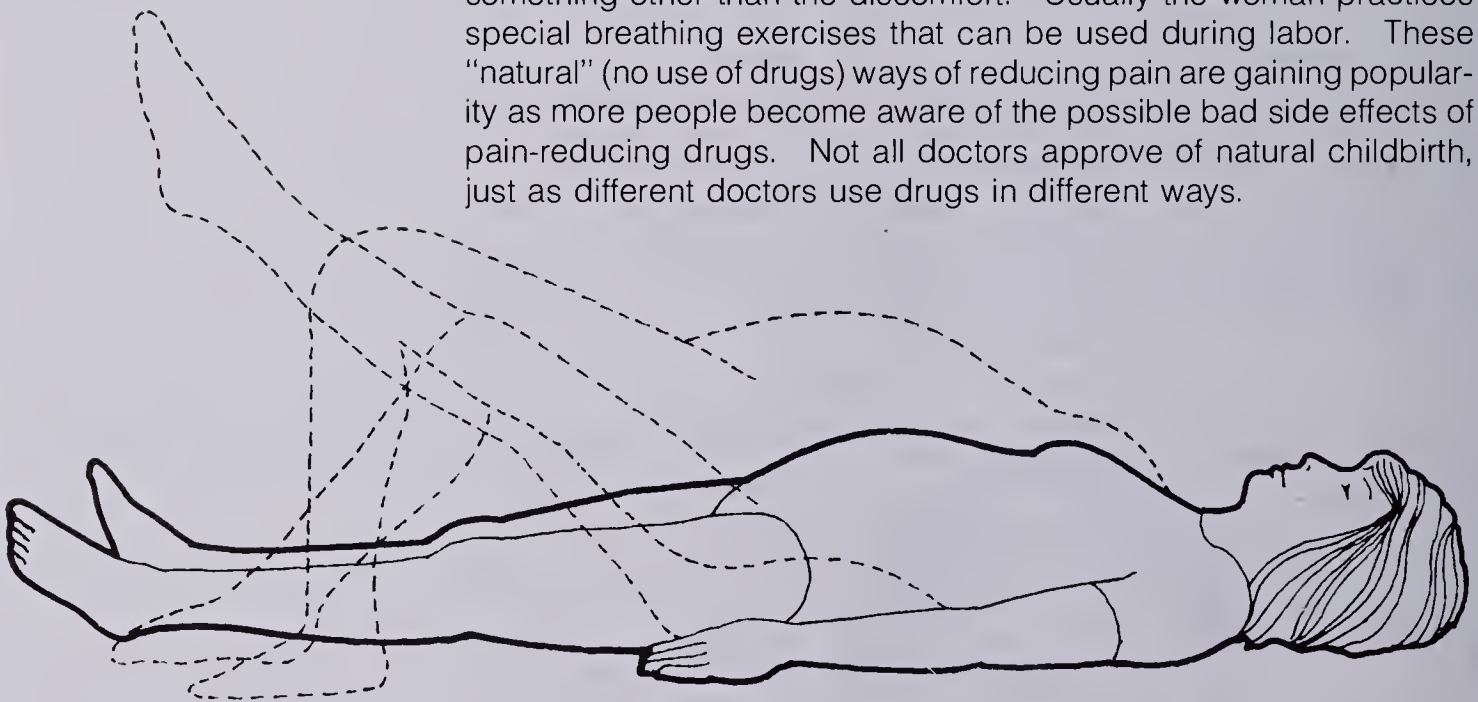
DRUG	EFFECT ON WOMAN	EFFECT ON BABY
Tranquilizers (Equanil®, Miltown®, Librium®, Valium®)	reduces pain; may cause sleepiness; relieves fear	some associated with birth defects
Narcotics (Demerol®, Dolophine®, Nisentil®)	stops pain	slows breathing and body movements
Barbiturates (Nembutal®, Seconal®)	causes sleep; relieves fear	slows breathing and body movements
Inhaled gas (ether, nitrous oxide, Trilene®)	can slow labor and cause vomiting; re- laxes uterus; can make woman feel lightheaded and giddy	sleepiness
General anesthesia	complete uncon- sciousness; no push- ing to help baby through birth canal	must be delivered with forceps or by cesarean; makes baby sleepy
Regional anesthesia	conscious, but numb from waist down; lasts for about an hour; may cause headache later; may cause drop in blood pressure and shock	makes baby sleepy, but does not slow breathing; must be delivered with forceps
Local anesthesia	can stop pain during labor or delivery; lasts about an hour; can be poisonous if injected into veins	little effect

Figure 9–1

- 9–2. Which kinds of drugs can slow the breathing of the newborn baby?
- 9–3. Which drugs make the woman unconscious during delivery?

Scientists do not know exactly how drugs work in the human body, so they cannot be sure of their effects. It is possible that the drugs listed in Figure 9–1 have other short- and long-term effects that have not yet been discovered. Each decision to give drugs during childbirth must weigh the probable good effects against the possible bad effects. In general, the feeling of most doctors today is that the fewer drugs given, the better.

An alternative to drugs during childbirth is to reduce fear and anxiety in the mother. That's what childbirth-preparation classes try to do — teach the parents what to expect during labor and delivery so they won't be afraid. The parents can learn how to concentrate on something other than the discomfort. Usually the woman practices special breathing exercises that can be used during labor. These “natural” (no use of drugs) ways of reducing pain are gaining popularity as more people become aware of the possible bad side effects of pain-reducing drugs. Not all doctors approve of natural childbirth, just as different doctors use drugs in different ways.



- 9–4. What's the general view about the use of drugs during childbirth?
- 9–5. How can childbirth preparation help reduce pain during childbirth?
- ★ 9–6. **Why do many doctors dislike using drugs to reduce the pain and discomfort of childbirth?**
- ★ 9–7. **How may drugs given to reduce pain during childbirth affect the activity of the newborn baby?**



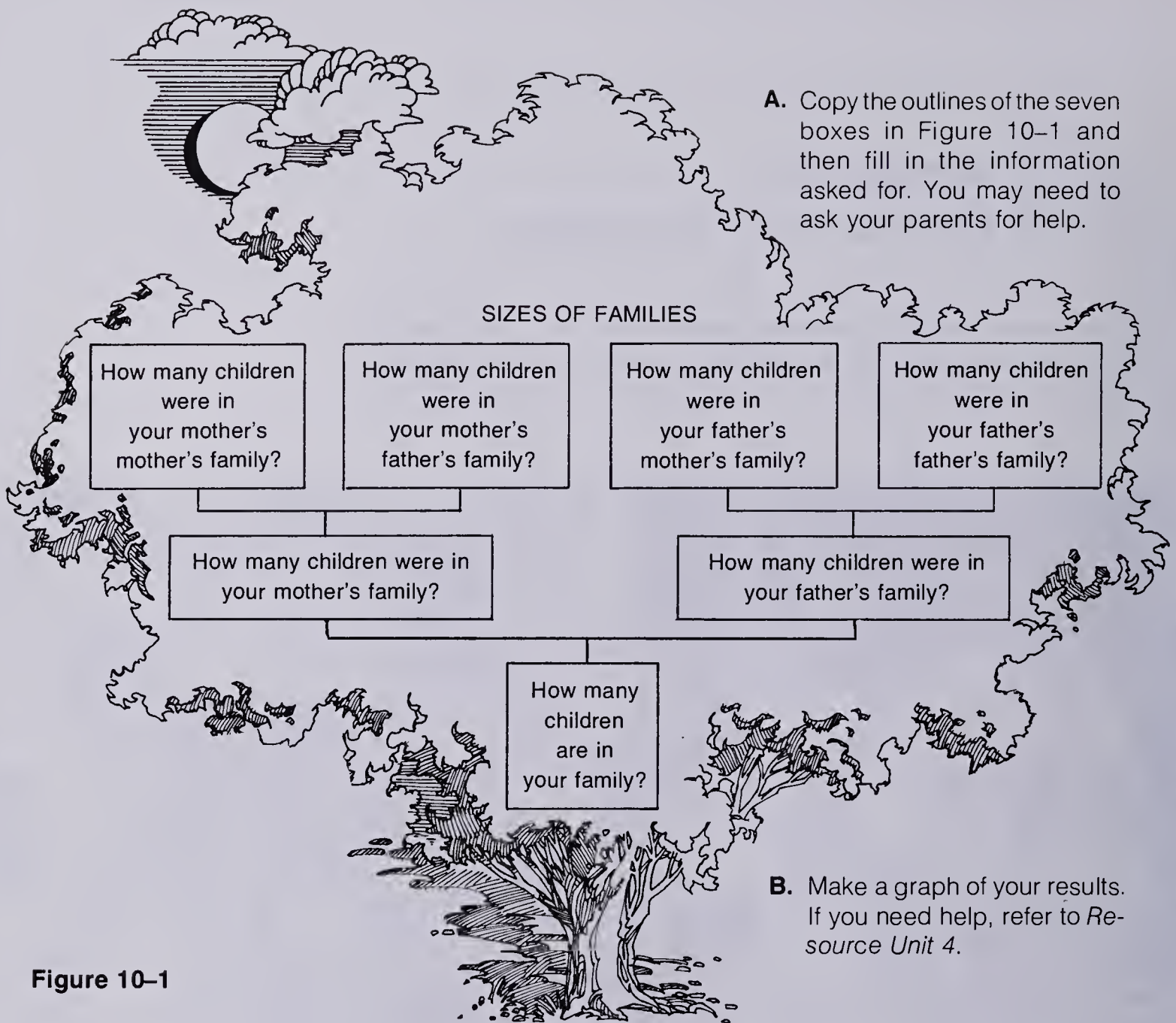
Activity 10

Births and Families

How many is a family? There are families that have six, eight, ten, or more children. But if you think about your friends and their families, you'll probably find that most of them live in families that have between one and four children.



In colonial days, the average number of children in a family was about eight. Today, the average number is a little more than two. So over the years, there has been a trend toward fewer children in a family. See if the same trend has occurred in your family.



A. Copy the outlines of the seven boxes in Figure 10–1 and then fill in the information asked for. You may need to ask your parents for help.

B. Make a graph of your results. If you need help, refer to *Resource Unit 4*.

Figure 10–1

- 10–1. Is there a trend toward fewer children in your family?
- 10–2. How is the average size of a family today different from the average size during the colonial period?

If there aren't as many children in families as there used to be, something must be happening to the *birthrate*. Birthrate is defined as the number of births each year for every thousand people in the country. If the birthrate is 20.0, then there were twenty babies born that year for every (per) one thousand people in the country.

Figure 10–2 shows a table of the births per one thousand people each year in the United States from 1960 to 1974. Figure 10–3 shows the same information on a graph. If you have trouble understanding the graph, read *Resource Unit 2*.

POPULATION CHANGE IN THE UNITED STATES

YEAR	BIRTHRATE (BIRTHS PER 1000 POPULATION)	YEAR	BIRTHRATE (BIRTHS PER 1000 POPULATION)
1960	23.8	1968	17.6
1961	23.5	1969	17.8
1962	22.6	1970	18.3
1963	21.9	1971	17.3
1964	21.2	1972	15.5
1965	19.6	1973	15.0
1966	18.5	1974	15.0
1967	17.9		

Figure 10–2

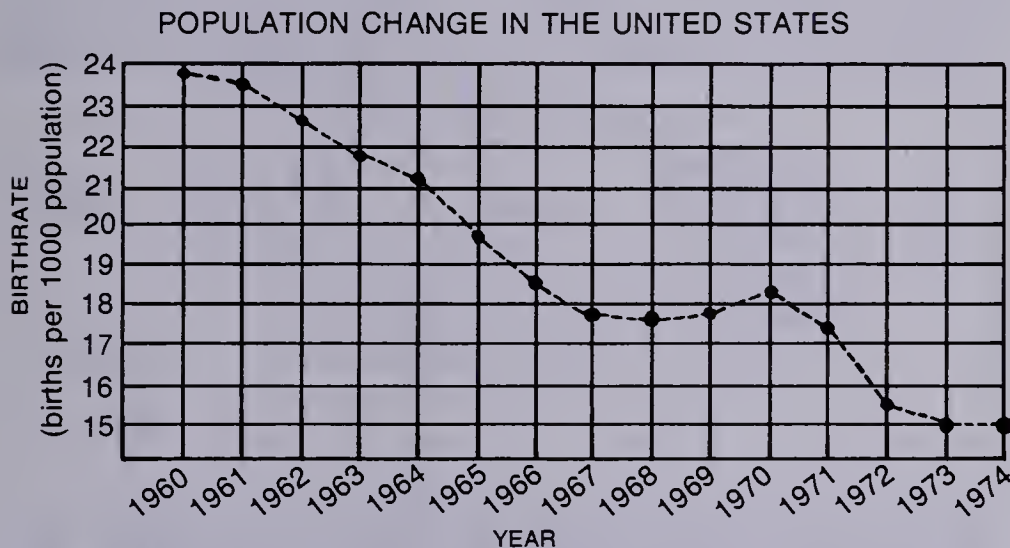
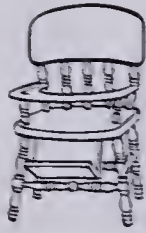


Figure 10–3

★ 10–3. Using the information in Figures 10–2 and 10–3, what can you say about the trend in birthrates in the United States?

- 10 – 4. In Figure 10–3, the steeper the line is from one year to the next, the bigger the change in birthrate. What one-year period (from 1960 to 1974) shows the biggest drop in birthrate?
- 10 – 5. What do you predict will happen to the birthrate during the next five years?
- 10 – 6. Do you think family size will increase, decrease, or stay the same during the next five years? Does this fit the trend already noticed?



Activity 11

Learning To Think and Communicate

Suppose you were asked which pile of chocolate candies in Figure 11-1 you would like to have.

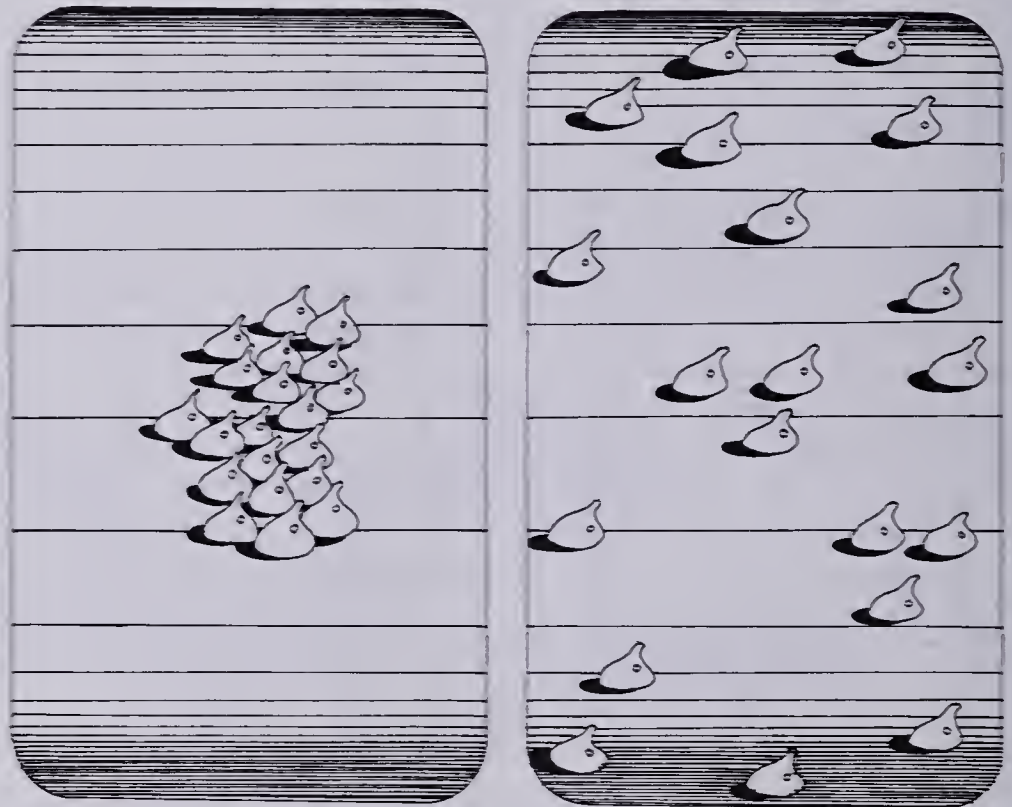


Figure 11-1

- 11-1. Assuming you like chocolate, which pile — the left or the right — would you choose? Explain your choice.

If you are like most teenagers, you don't see much difference between the two piles. Both piles contain twenty pieces of candy, and all of them are the same. The pieces in one pile are spread apart, but that doesn't affect the amount of candy or its taste.

Many very young children react differently to the candy problem. Even though they can count, they pick the spread-out pile and explain their choice by saying, "It has more candy." Psychologists have wondered why children react as they do to problems like this. Many of them have decided that adult thinking takes time to develop.

Figure 11–2 is based on one psychologist's theory about how adult thinking develops. His name is Jean Piaget [pee-ah-ZHAY], and his theory is that everyone goes through about four stages in developing adult thinking.

Keep in mind that the ages in the table are averages. Not everyone learns to crawl, walk, run, and skip at the same ages. And not everyone gets to each mental development stage at exactly the same age.



MENTAL DEVELOPMENT		
STAGE	YEARS	CHARACTERISTICS
1	0–2	Children at this stage solve problems using what they see, feel, smell, or taste at that moment. Something hidden doesn't exist. Children are easily misled by their senses at this stage.
2	2–7	Children solve problems more by trying and making mistakes than by thinking out answers. They trust what they experience, not what makes sense.
3	7–12	Children are now able to solve simple problems by thinking rather than by trial and error. They think mostly about things personally experienced. They can still be misled by their senses.
4	over 12	Adult thinking. Adults can think through complicated problems not experienced. They can use evidence to predict things that have not yet happened.

Figure 11–2

Keep the information in Figure 11–2 in mind as you read Figure 11–3 on pages 38 and 39.

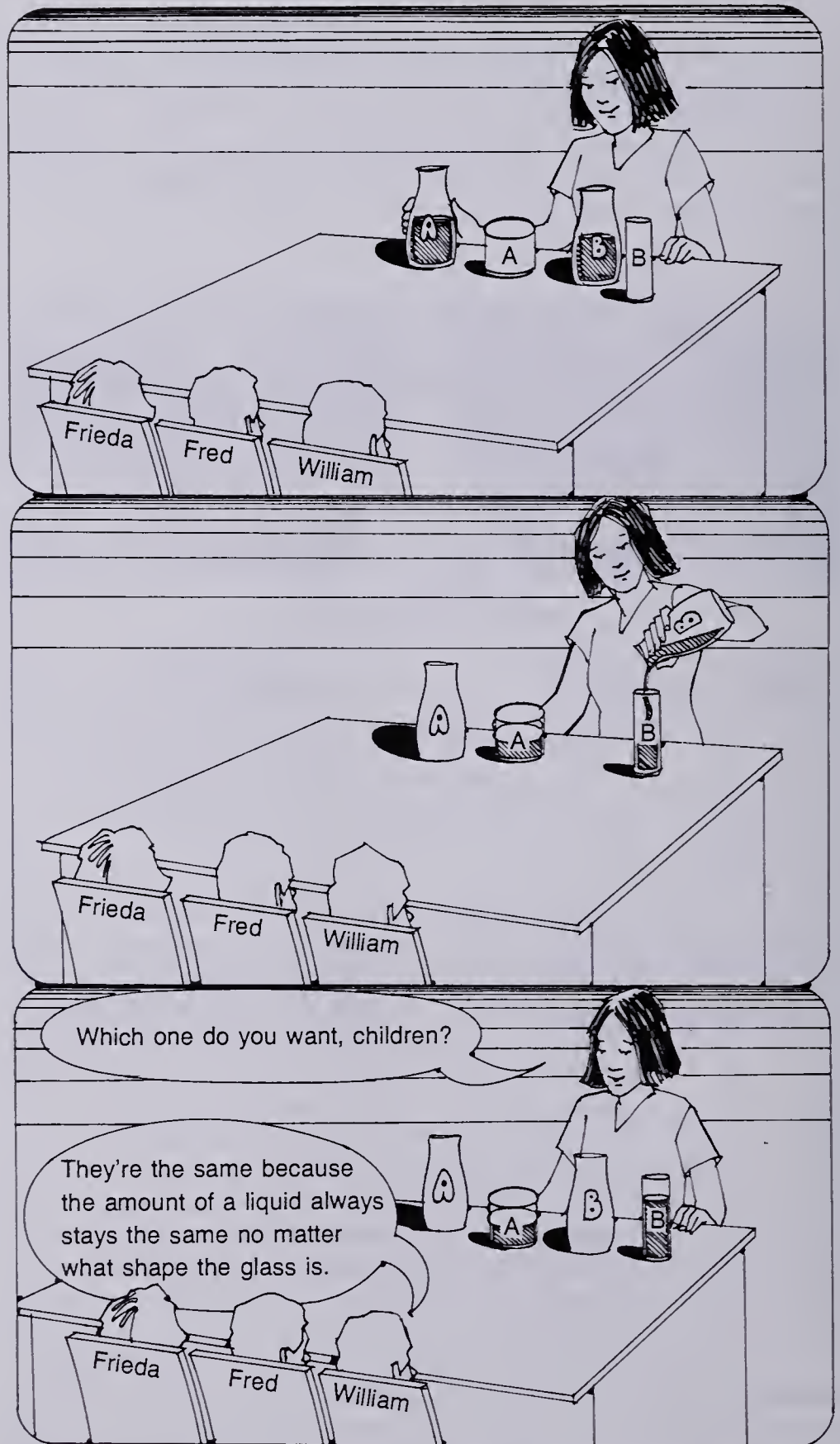


Figure 11-3

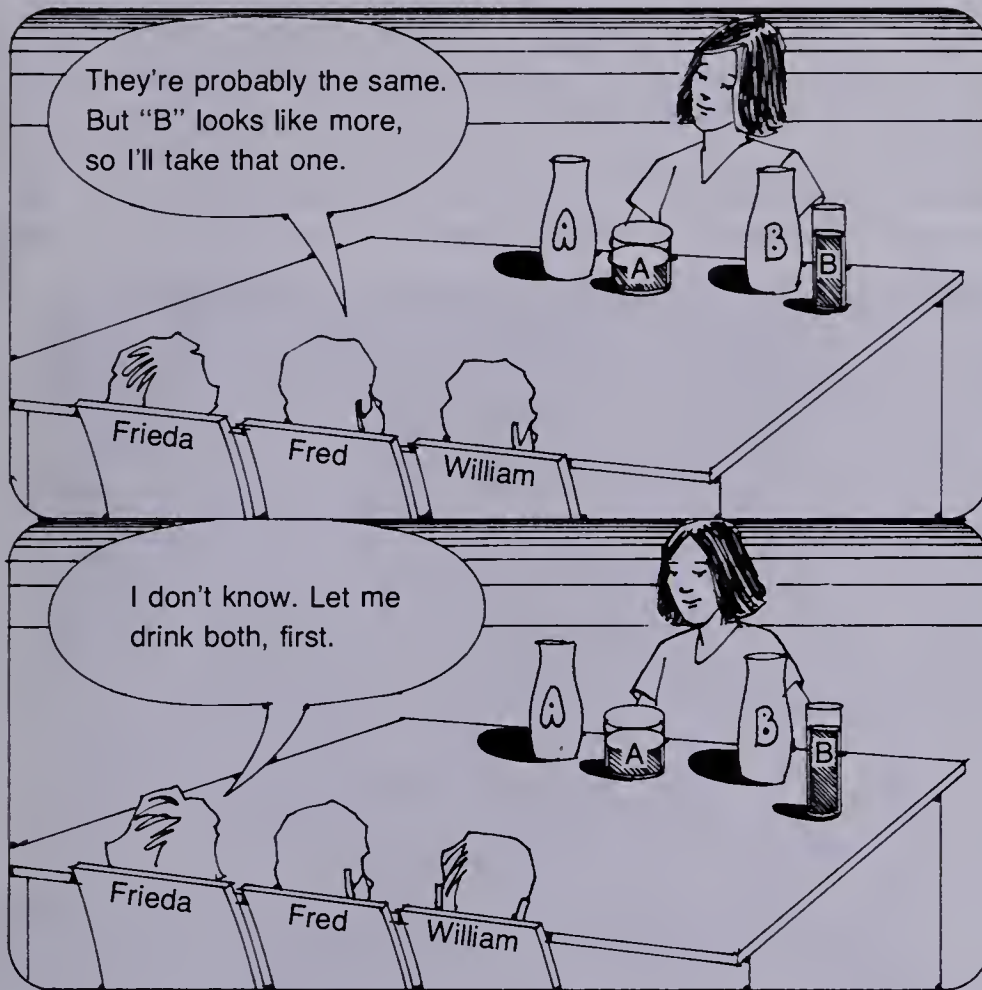


Figure 11-3 (continued)

- ★ 11-2. Look at Figure 11-3. According to the way they respond to the question asked of them, what is the approximate age of William? Of Frieda? Of Fred? (Hint: All are older than 2 years.)
- ★ 11-3. Using Figure 11-2, match the stage of mental development with the person or persons who have most likely reached it.

Stage

- a. first stage
- b. second stage
- c. third stage
- d. fourth stage

Person

- 1. high school senior
- 2. kindergarten student
- 3. grandmother
- 4. voter in national election
- 5. toddler just learning to walk
- 6. infant just home from the hospital
- 7. junior high school cheerleader
- 8. cub scout (age 9)

Learning to speak is another way children develop. Most children are born able to make all the sounds in all spoken languages. Children a few years old can make only the sounds they hear repeatedly. When adults study a language that has sounds they didn't learn to make as young children, they aren't likely to speak the new language as well as a native of a country in which the language is commonly spoken.

- 11 – 4. Would a child born and raised in Japan and whose parents were German be able to speak Japanese as well as Japanese children? Explain.

Most of the important things about language, except a large vocabulary, are learned by ages four to six. Most six-year-old children can ask questions, make demands, and talk about the past, present, and future. After age six, language development is mostly learning new words. Figure 11–4 describes a child's progress in learning English. Here again, remember that people develop at different rates.

LANGUAGE LEARNING

STAGE	AGE
1. Babbling: "ba-ba-ba, me-me, da-da-da-da"	approximately 6 months
2. Saying first words: "mama, dad-da"	10 to 12 months (about a year)
3. Combining words: "that horsie" "my ball" "bad doggie"	18 to 24 months (1½ to 2 years)
4. Completed development: "Who is that man?" "I want some milk."	48 to 72 months (4 to 6 years)

Figure 11–4

When children move from the babbling stage to the stage of saying words, their first words may not make much sense to adults. In fact, the words may not even sound like words to an adult. But they seem to mean something to the child using them. To understand what young children are saying, you often have to look at what they are doing.



Figure 11–5

- 11 – 5. What might the child in Figure 11–5 mean if she is saying, “pit-ty”?
- ★ 11–6. **At what age would a child probably be able to make each of the following statements?**
 - a. I stayed at home.
 - b. See doggie.
 - c. mama, mama
 - d. didididi

When speaking, a very young child leaves out certain kinds of words. An adult says, “The dinner is all gone.” But a young child says, “Dinner all gone.” The child learns certain parts of the language before others. Instead of saying, “I went home,” a young child might say, “I goed home.” He or she has learned that *-ed* on the end of a word means something has already happened, but doesn’t know the special word “went” yet. Gradually, the child’s speech becomes more adultlike.



Activity 12

The Body Changes

The human body undergoes many changes between birth and adulthood. You know how the human body usually looks at different ages because you've been looking at people of different ages all your life.

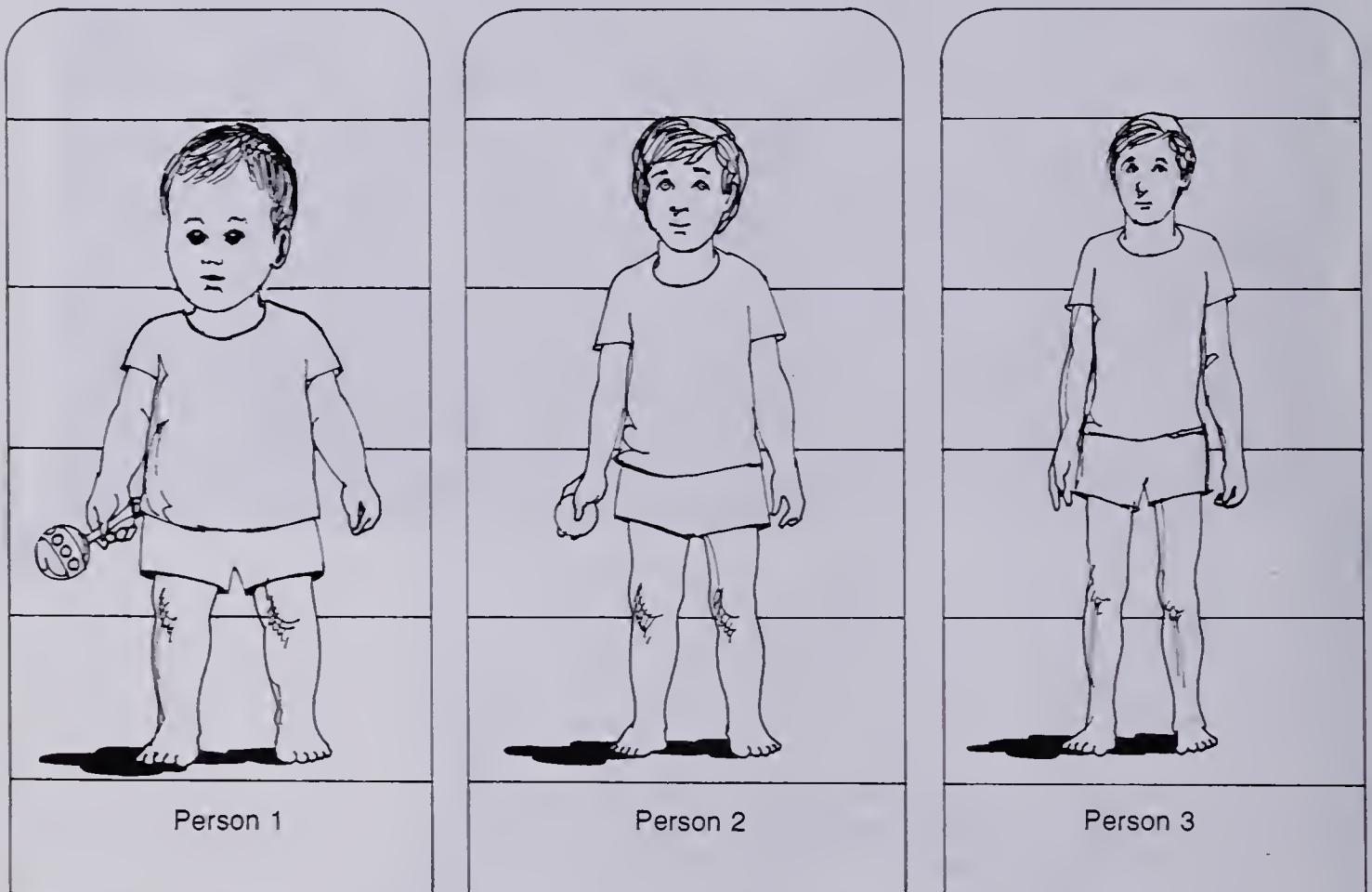


Figure 12-1

- 12-1. Look at Figure 12-1. About how old is each person?

Even though you can't tell how tall the three people are, there are clues to their ages. Their faces look different, their body shapes are different, and the proportions (relative sizes) of their body parts are different. In Figure 12-1, Person 1 is about one to two years old; Person 2 is about four to eight years old; Person 3 is probably between twelve and sixteen years old.

- 12–2. Most people judge age by looking at the face. In Figure 12–1, which person has the largest eyes compared to the head? The roundest face? The narrowest face?
- ★ 12–3. During which age period (1–2, 4–8, or 12–16) would a person's head be largest when compared to the rest of the body?
- 12–4. During which age period would a person's arms be longest when compared to the rest of the body?

Another remarkable thing in children is the rapid growth that changes a helpless, newborn infant into a skilled two-year-old toddler. But before looking at a child's development, there are two things to keep in mind:

No two children are exactly alike at a certain age.

The development of a child takes place continuously, not in separate jumps or steps.

Look at Figure 12–2, which continues on the next page. The pictures show one child's muscle coordination from birth to six years old.

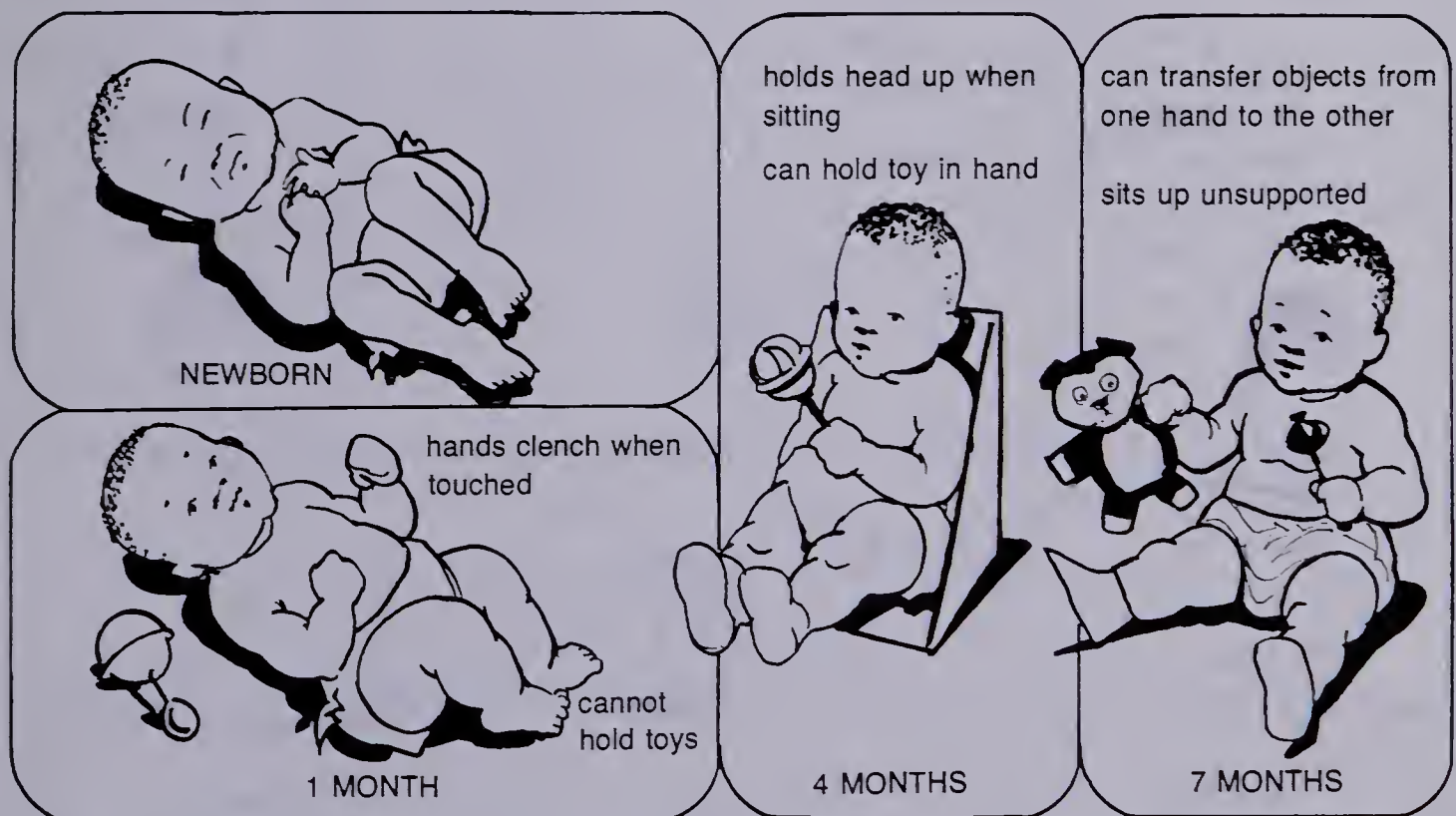


Figure 12–2



Figure 12-2 (continued)

- ★ 12-5. Place the following activities in the order in which most children are able to do them.
- walk up and down stairs
 - throw objects
 - crawl
 - dress without help
 - feed self

Height is the most obvious growth change. Look at Figure 12-3. It shows that growth is most rapid from birth to about age 5. Then growth slows until about age 12, when it again increases quickly for a short time. Then it slows down again. Girls start their second spurt of growth a bit before boys. Although people end up being different heights, all people follow the same general pattern of growth.

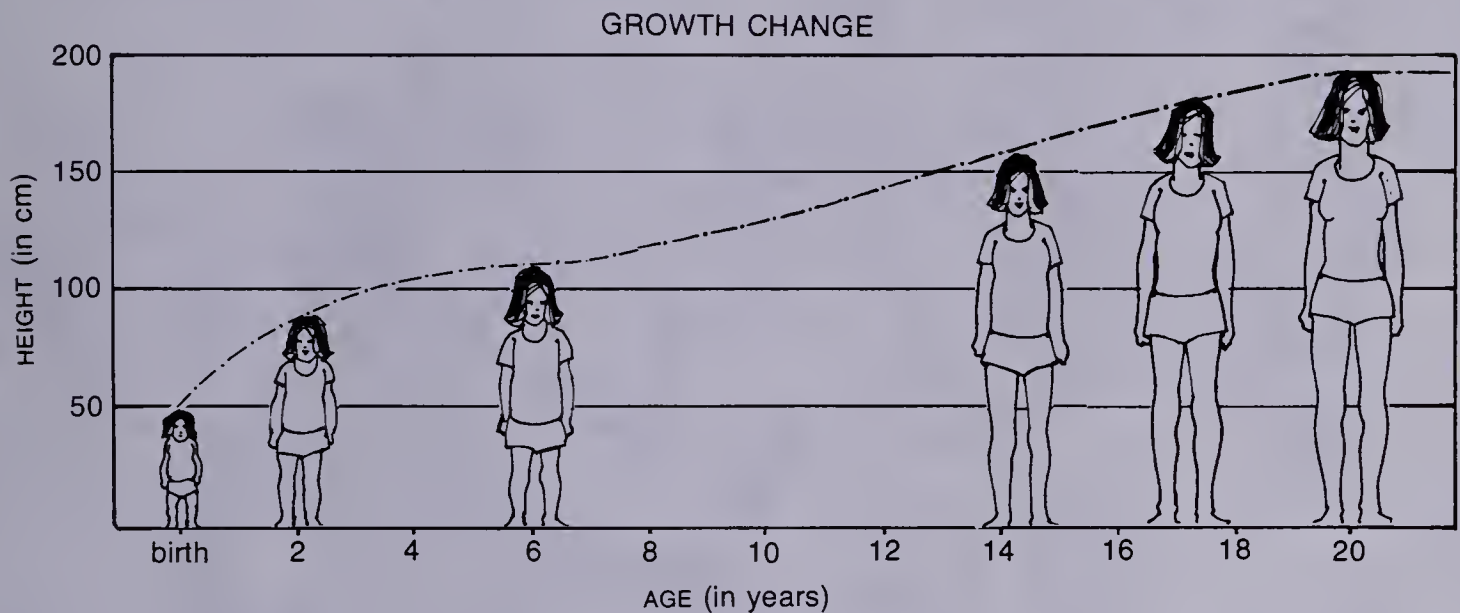


Figure 12-3

- ★ 12-6. Do boys or girls usually start their second growth spurt first?
- 12-7. Is the average rate of growth greater from birth to two years or from six to eight years?
 - 12-8. Put the ages in order from most rapid increase in height to least rapid.
 - 5 years to 12 years
 - birth to 5 years
 - 12 years to 17 years
 - 17 years to 20 years

When people are fully grown, they are not alike. Many people's height and weight are fairly near an average value. But most people are not exactly average. They may be shorter or taller, heavier or skinnier than the average. Nearly everyone is included in the normal range of adult heights and weights.



A graph of a range of measurements in which most are near the average, but with a range of differences, will be shaped like the one in Figure 12-4. This graph is called a *normal curve*. It shows all of the different, possible normal measurements. The average measurements are near the middle; extreme measurements are at the ends.

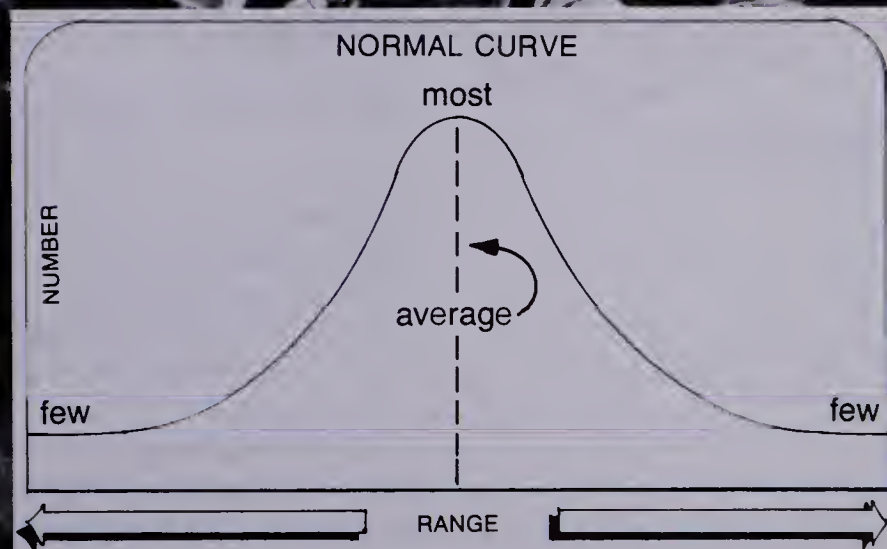


Figure 12-4

Suppose you measured the height of all the students in your class. If you graphed the measurements you obtained, your graph would look something like Figure 12–5.

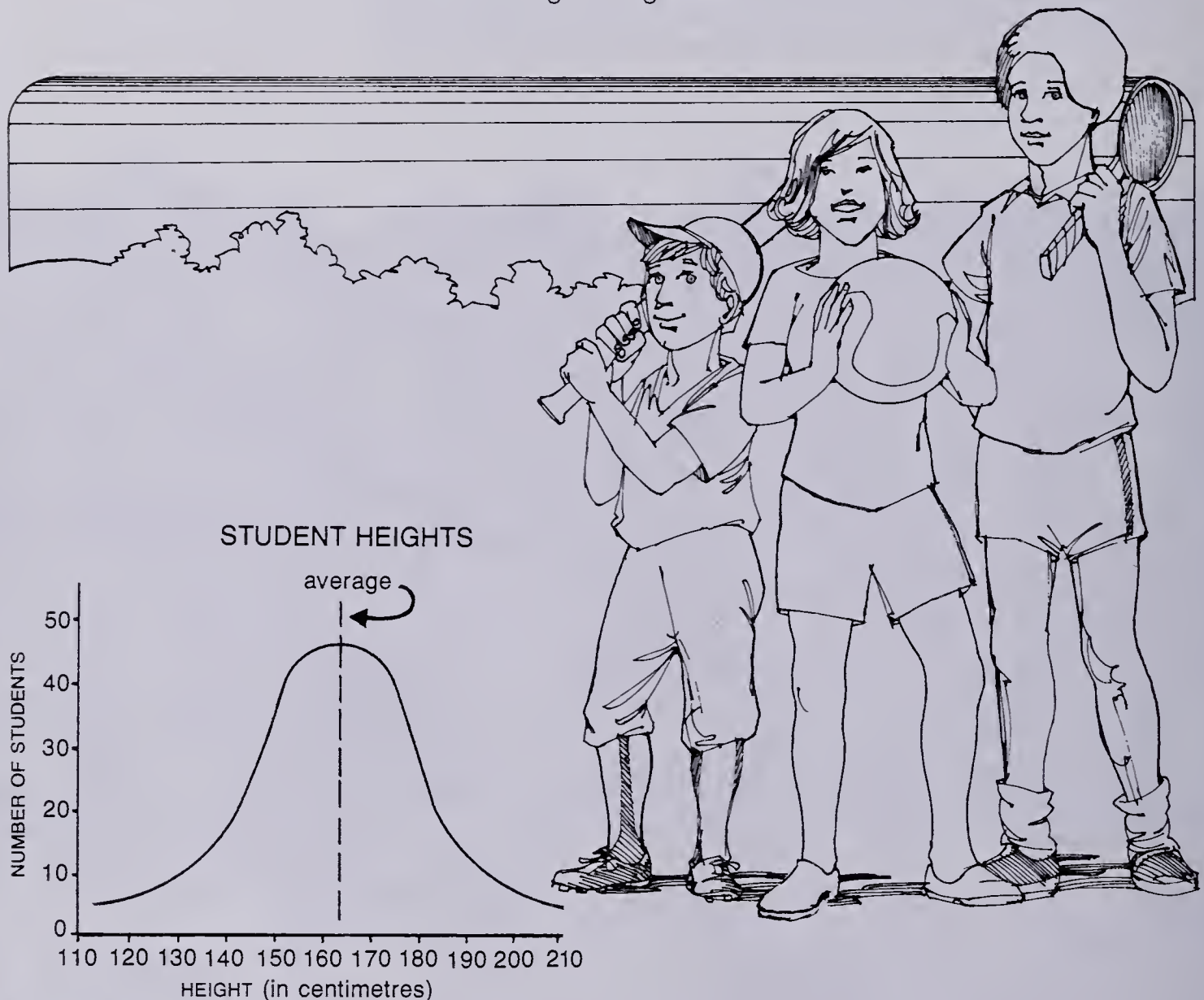


Figure 12–5

- 12 –9. In Figure 12–5, what is the average height of the group of students?
- 12 –10. Would the height of a very short person (130 centimetres) be included in the graph in Figure 12–5?

The *typical range* of a normal curve is that part of the graph that includes two-thirds of the measurements nearest the average. Figure 12–6 shows the typical range on a graph of the weights of a large number of people.

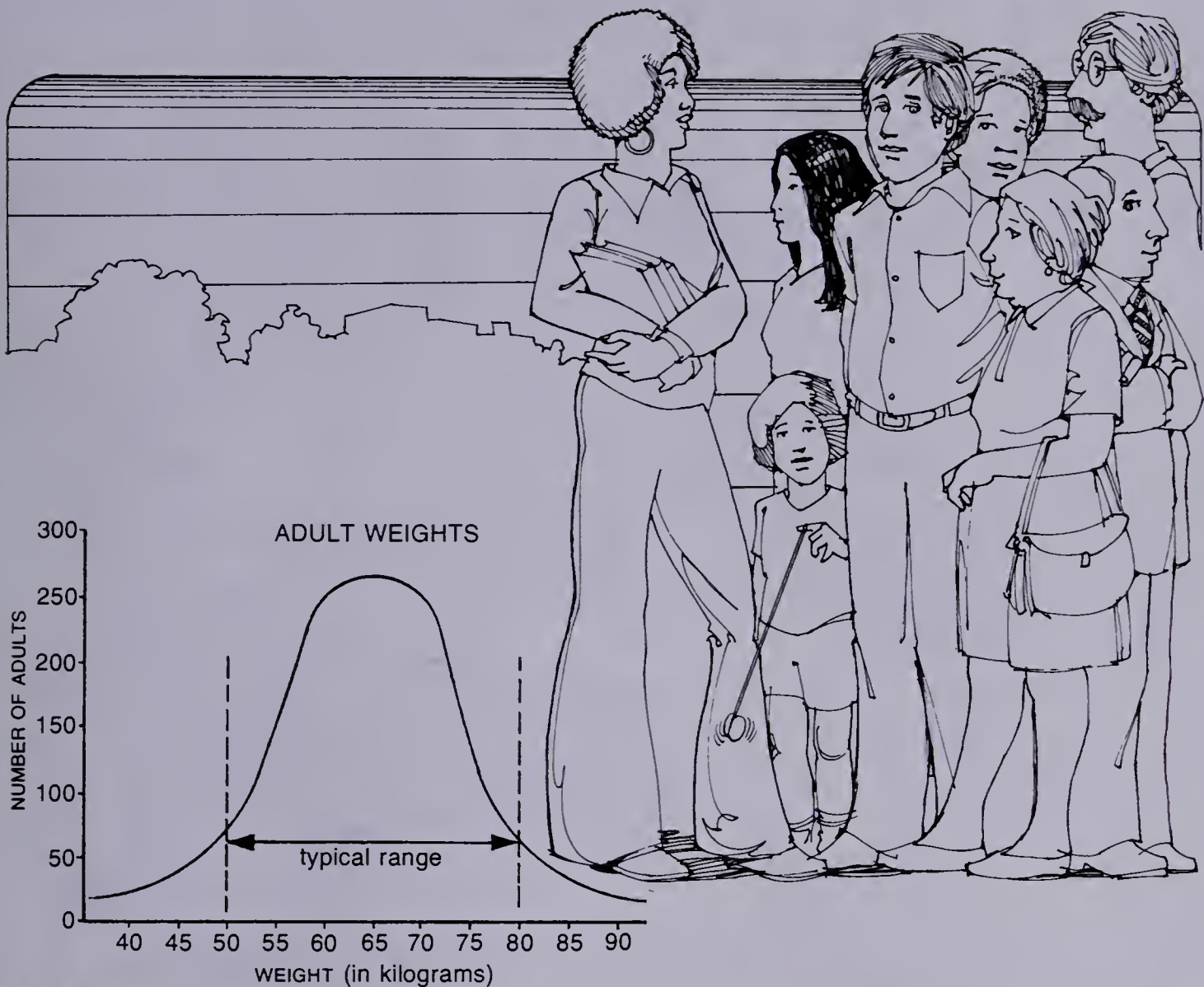


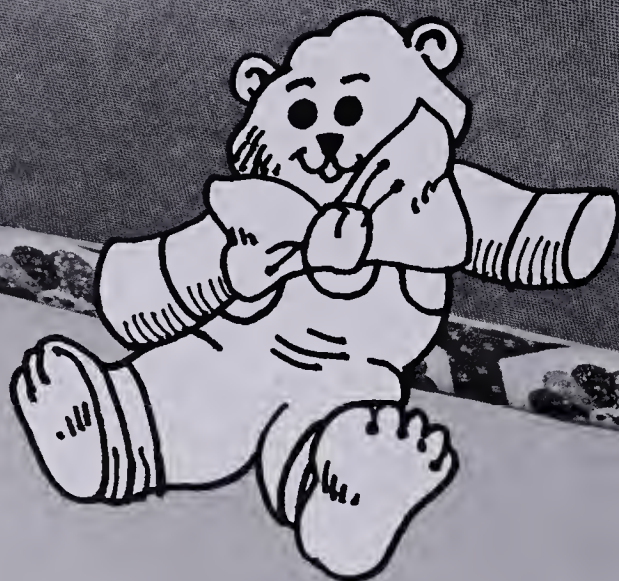
Figure 12-6

- 12-11. In Figure 12-6, what is the typical range of adult weights?
- ★ 12-12. What is the name of the curve that would result from a graph of the weights of many adults?
- ★ 12-13. Suppose the graph of a large number of measurements is a normal curve. The average of these measurements is 4 cm and the typical range is 3 cm to 5 cm. Describe what the graph would look like.

If this is the first time you have met normal curves, don't worry if you don't completely understand them. You will have a chance to study them in other minicourses. However, if you have met them before and are still feeling uneasy about them, you may want to read *Resource Unit 19*. It describes normal curves in more detail.



Activity 13 Advanced Planning



Activity 14 Page 52

Objective 14-1: Describe the problems that the Rh factor can cause during pregnancy, how the factor is inherited, and how the problems are prevented and treated.

Sample Question: The baby of an Rh+ woman and an Rh- man

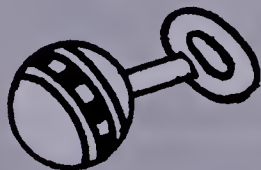
- a. will be Rh-.
- b. may be Rh-.
- c. will be Rh+.
- d. will not be Rh-.

Activity 15 Page 58

Objective 15-1: Describe how the presence of human chorionic gonadotrophin in urine is detected and used to determine pregnancy.

Sample Question: Which of the following is caused by human chorionic gonadotrophic hormone in pregnancy tests?

- a. the release of eggs in rabbits or toads
- b. an antigen-antibody reaction with rabbit antiserum
- c. a change in the color of the person's urine
- d. a change in the appearance of the test animal's ovaries



Activity 16 Page 62

Objective 16-1: Describe the four stages of Piaget's theory of intellectual development.

Sample Question: Match each stage with a characteristic of that stage according to Piaget's theory.

Stage

- a. formal operational
- b. sensorimotor
- c. preoperational
- d. concrete operational

Characteristic

- 1. begins to conserve number, weight, amount, and area
- 2. can solve problems logically and make theories
- 3. can think of things only from own point of view
- 4. begins to organize own behavior to achieve goals



Answers 14-1. b 15-1. a, b, d 16-1. a-2, b-3, c-4, d-1



Activity 14

The Rh Factor

The cause of a serious disease in infants called *erythroblastosis* [i-rith-ro-blas-TOE-sis] wasn't discovered until about 1940. Babies with the disease often died before or shortly after birth because their red blood cells were being destroyed.

In 1940, researchers discovered new substances in the blood of Rhesus monkeys. These substances are collectively called the *Rh factor*. The Rh factor is present in the blood of about 87% of all humans. People who have the Rh factor are said to be *Rh positive* (Rh+). Those who don't are *Rh negative* (Rh-).

After researchers discovered the Rh factor, they found that it was related to erythroblastosis. A baby who is Rh+ and has a Rh- mother is most likely to have the disease, especially if the baby is the second or third child of the Rh- woman. Fewer first children get the disease. Here's the way it works.

1 If an Rh- mother . . .

has an Rh+ baby . . .

The diagram shows a silhouette of a woman labeled 'RH-' with an arrow pointing to a fetus in her womb labeled 'RH+'.

2 Some of the baby's red blood cells may get into the mother's blood during pregnancy or, more likely, during birth when the placenta separates from the uterus.

baby's Rh positive blood

mother's Rh negative blood

The diagram shows a fetus in the womb with '+' signs (Rh+) and a placenta with '-' signs (Rh-). Arrows indicate blood flow between the fetus and the mother's blood.

3 The Rh- mother's body starts producing antibodies that destroy Rh+ blood cells.

mother's antibodies

Those antibodies can cross the placenta and break down the Rh+ red blood cells of the Rh+ baby. This usually is not enough to seriously damage the first baby.

The diagram shows a fetus in the womb with '+' signs (Rh+) and a placenta with '-' signs (Rh-). Arrows indicate antibodies (marked with asterisks) crossing the placenta to attack the baby's blood cells.

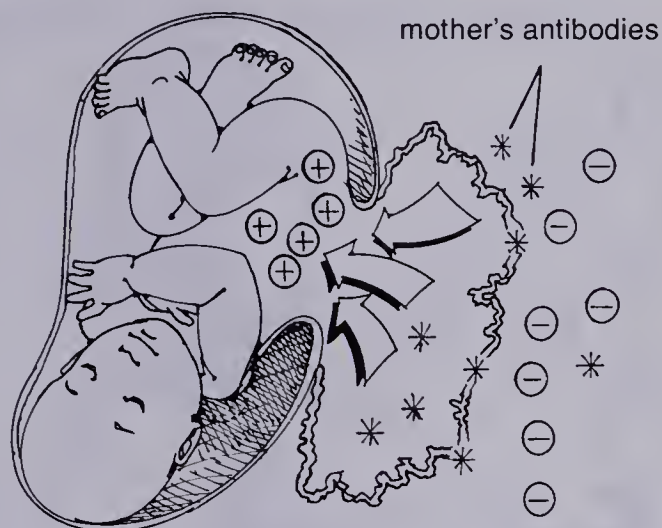
4

If the mother gets pregnant again . . .



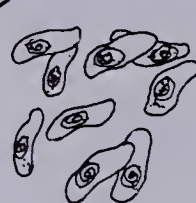
and if this baby is Rh+, the mother may quickly produce large numbers of antibodies that can cause death or *erythroblastosis*.

5

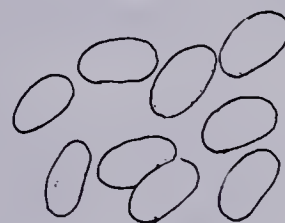


In erythroblastosis, the baby's red blood cells are constantly being destroyed by the mother's antibodies.

6



immature cells



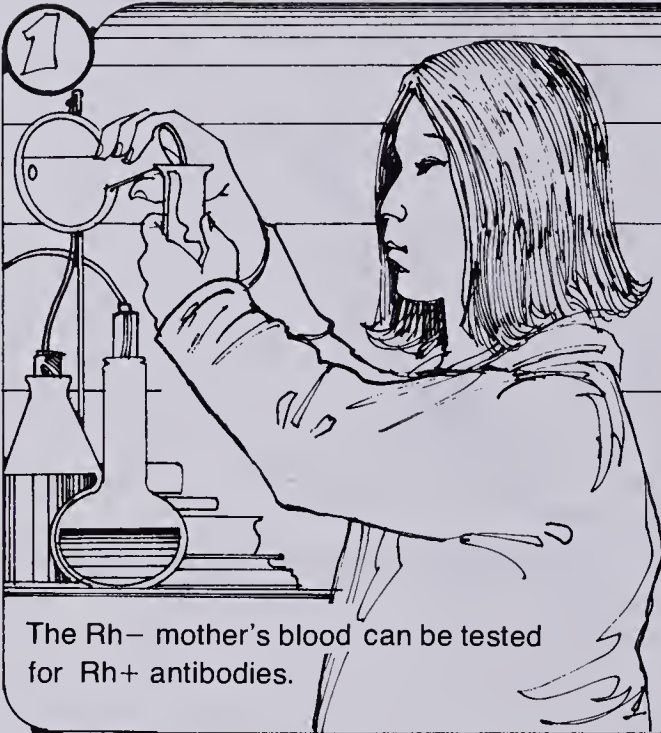
mature cells

The baby's body tries to make up for the loss of red blood cells by producing more. But these are immature red blood cells (erythroblasts). They can't do all the jobs they should, such as carrying oxygen.

- 14-1. What causes an Rh- woman's body to produce antibodies to Rh+ blood?

- ★ 14-2. What destroys the red blood cells in an Rh+ baby with erythroblastosis?

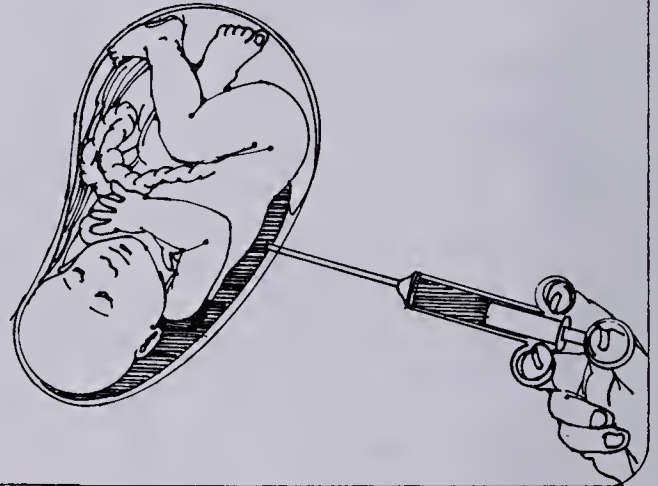
Fortunately, there have been new developments in medical treatment for erythroblastosis.



The Rh- mother's blood can be tested for Rh+ antibodies.

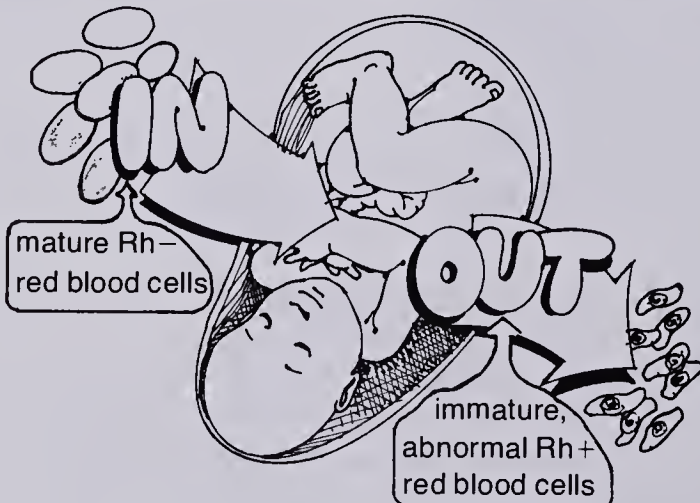
2

If erythroblastosis is suspected, some fluid from the sac around the baby can be safely removed and the red blood cells examined.



3

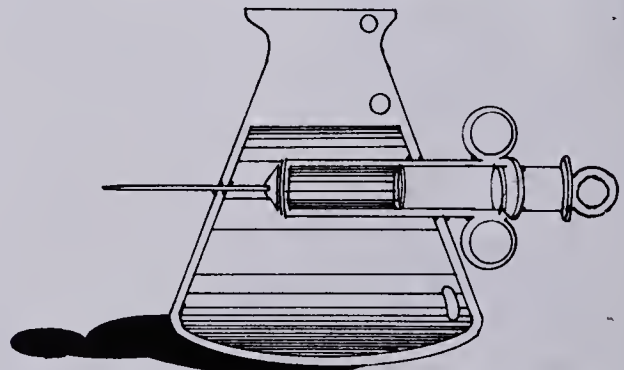
If erythroblastosis is present, the baby's blood can be exchanged before or after birth.



If the baby receives no more Rh+ antibodies, it can produce mature Rh+ red blood cells.

4

A method for prevention was discovered in 1968. If the Rh- woman hasn't produced Rh+ antibodies, she is injected with a substance after the birth of each Rh+ baby.



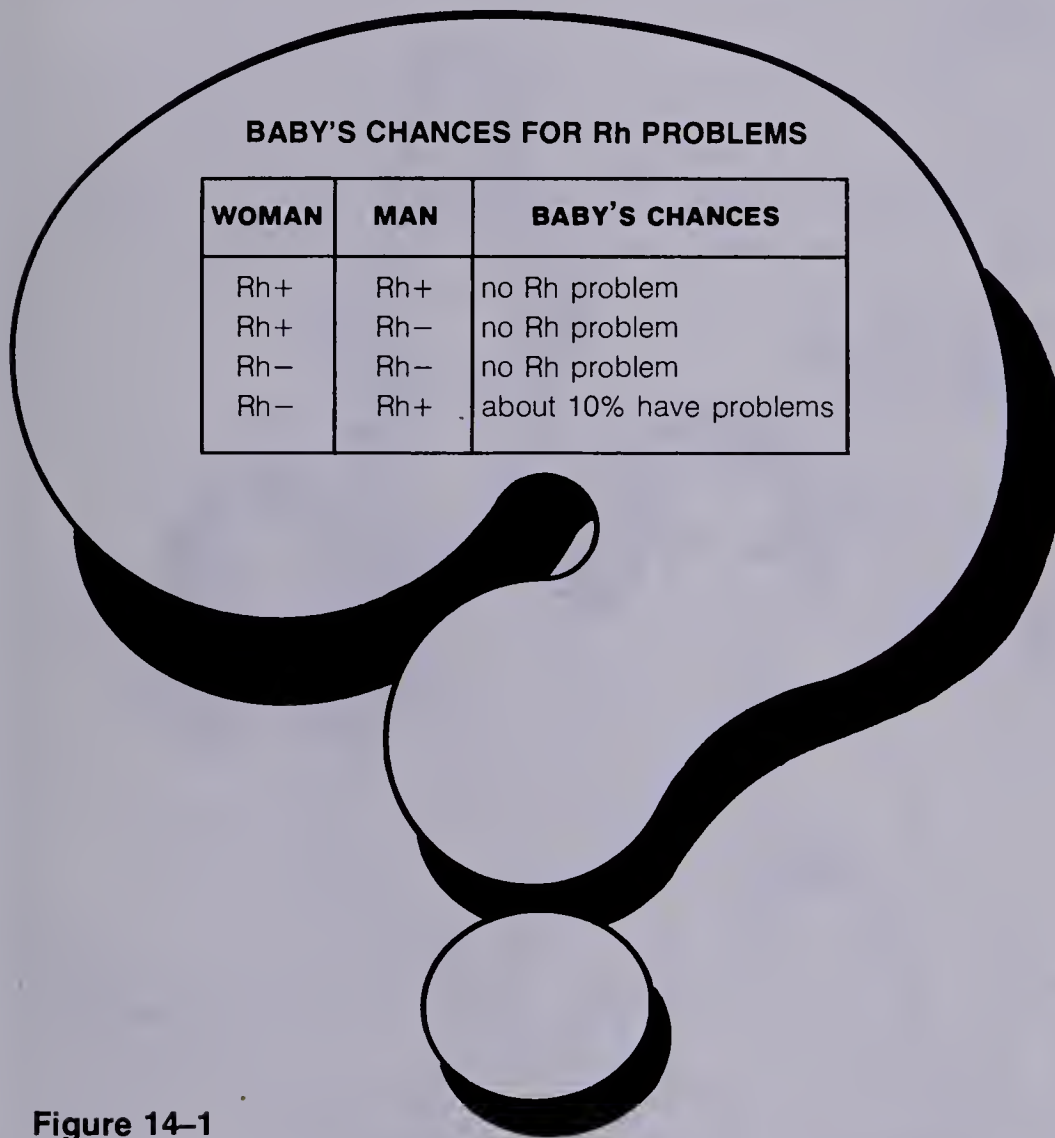
This reacts with any Rh+ blood cells she may have gotten from the baby. Her body produces no Rh+ antibodies.

★ 14-3. Describe one way Rh+ babies from Rh- mothers can be treated for erythroblastosis.

★ 14-4. Describe how Rh- women can be treated to prevent their Rh+ babies from getting erythroblastosis.

So, Rh– women carrying Rh+ babies may have problems, particularly with pregnancies after the first.

You may wonder how a woman without the Rh factor can produce a baby with the Rh factor. Look at Figure 14–1.



BABY'S CHANCES FOR Rh PROBLEMS

WOMAN	MAN	BABY'S CHANCES
Rh+	Rh+	no Rh problem
Rh+	Rh–	no Rh problem
Rh–	Rh–	no Rh problem
Rh–	Rh+	about 10% have problems

Figure 14–1

★ 14–5. Which combination of Rh factors in men and women can lead to problems for their babies?

Only one combination of Rh factors in a woman and a man is dangerous. All the others are safe. The reason for this has to do with how the Rh factor is inherited by the baby from its parents.

As you may know, all your physical characteristics were inherited from your parents. There are genes for every part of you in the chromosomes you received from the sperm and egg that combined at your beginning.

Often, a gene has more than one form. So, a person could have one form of a gene for Rh+ blood and another form for Rh– blood.

All the different possibilities are shown in Figure 14-2. Because the form for Rh+ blood is *dominant*, anyone with at least one Rh+ form of gene will have Rh+ blood. If only Rh- forms of the gene are present, the person's blood will be Rh-.

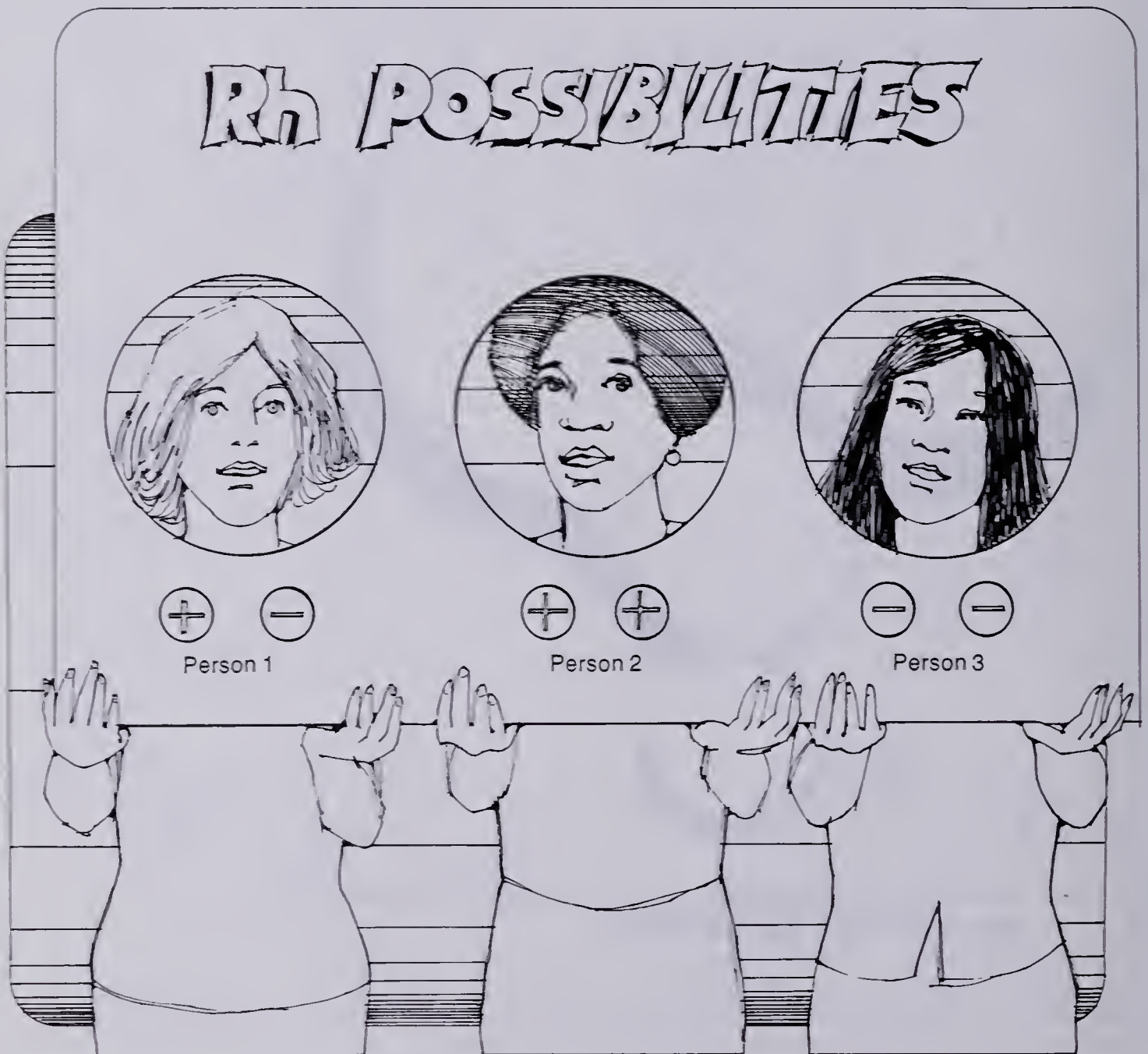
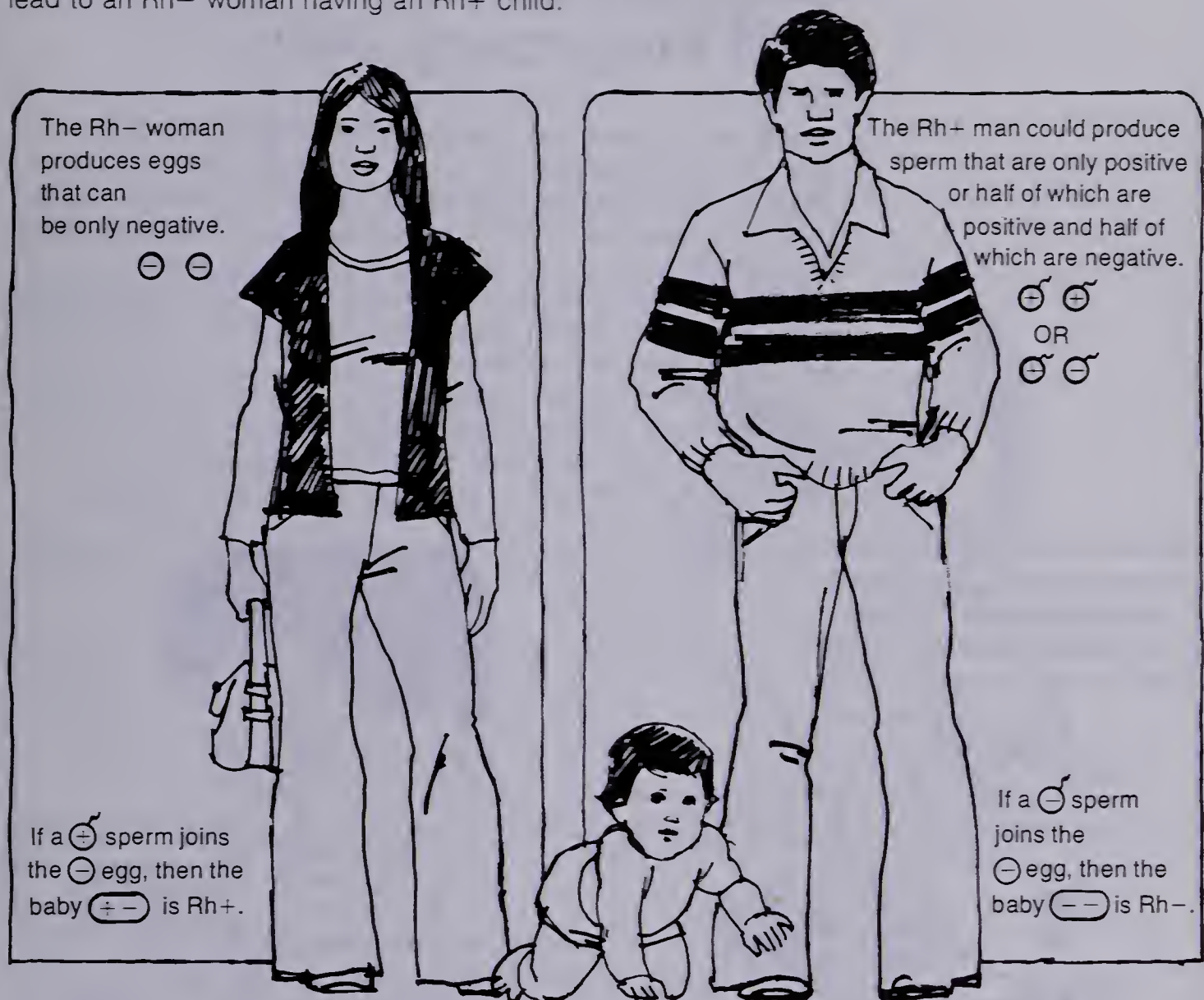


Figure 14-2

- 14 -6. What type of blood does each person in Figure 14-2 have?
- 14 -7. Which gene pair leads to Rh- blood?

From Figure 14-1, you know that only the combination of an Rh- woman and an Rh+ man can produce an Rh health problem, and then only if the baby is Rh+. Here's how the combination of Rh factors can lead to an Rh- woman having an Rh+ child.



★ 14-8. Suppose a man has both genes for Rh+ and a woman has both genes for Rh-. What will the Rh factor of their children be?

- 14-9. Why don't all Rh- mothers and Rh+ fathers have to worry about their children having Rh- problems?

Thanks to modern developments in science and medical techniques, the Rh problem is not much of a problem anymore. Now it's a rare case when a baby suffers damage or death from Rh-caused erythroblastosis.



Activity 15 Pregnancy Tests

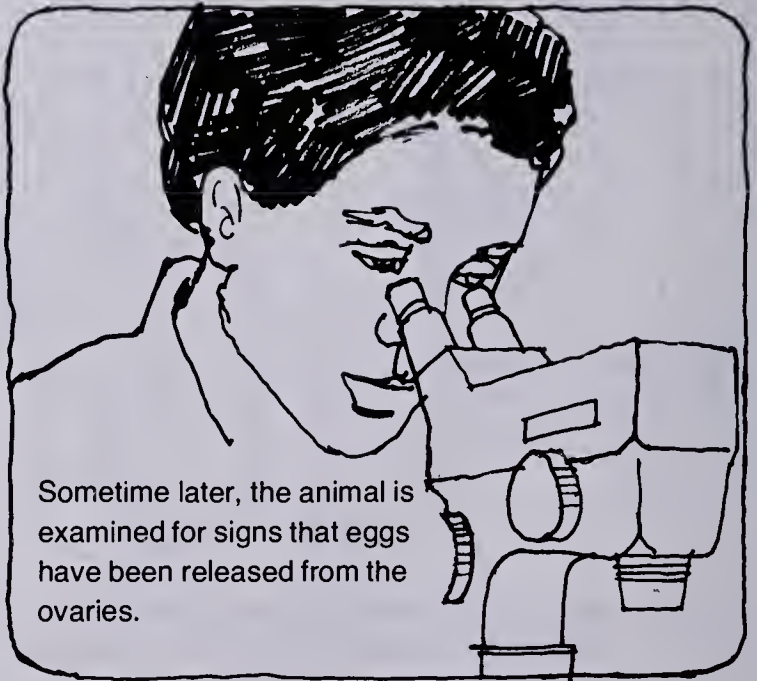
Almost all pregnancy tests depend on the presence of a particular hormone in a pregnant woman's urine. The hormone is called *human chorionic* [kor-e-ON-ic] *gonadotrophin* [go-nad-a-TRO-fin]. Human chorionic gonadotrophin (HCG) is produced only by the placenta in a pregnant woman's uterus. HCG is carried through the woman's bloodstream, and some gets into the urine. HCG is not present in the blood or urine of women unless they are pregnant, because only pregnant women have a placenta.

Since 1928, a number of different pregnancy tests have been developed. Many involve animals whose bodies respond to HCG. Many of these tests are done in the following way, and take 4 hours to 4 days to be performed.

Urine from a woman is injected into *female* test animals. These are female mice, rats, toads, or rabbits that have never mated.



Sometime later, the animal is examined for signs that eggs have been released from the ovaries.



POS.

Positive sign (pregnancy): Eggs have been released, or the ovary has changed in appearance.

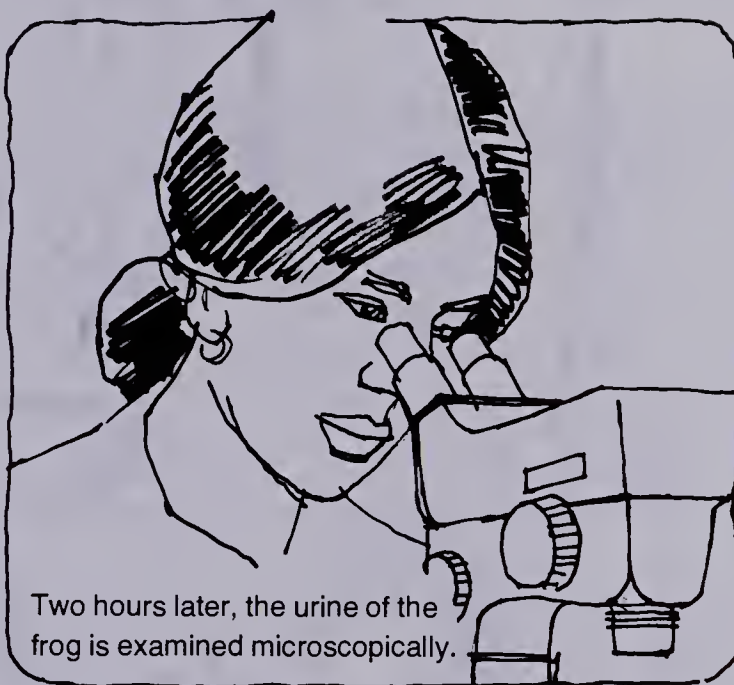
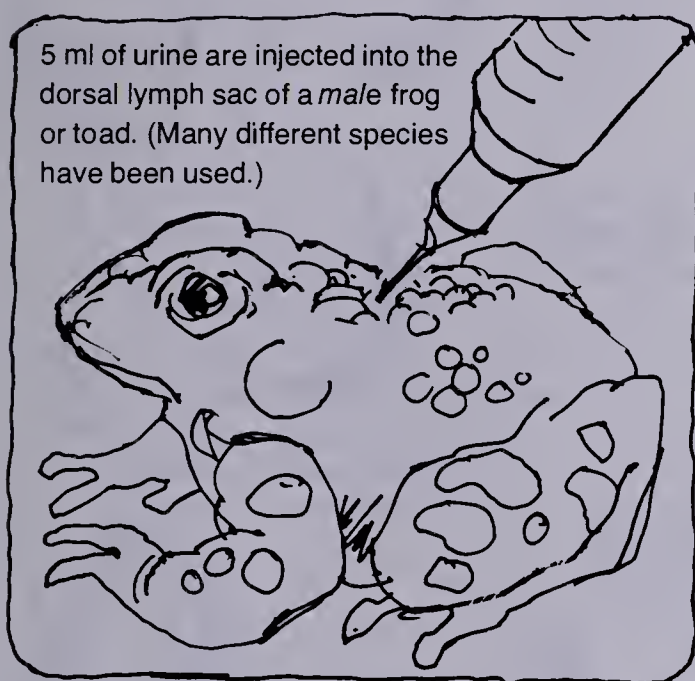
NEG.

Negative sign (no pregnancy):
There is no change in the animal's ovaries and no eggs have been released.

- 15 –1. Before the first pregnancy test was developed, how did women know they were pregnant? (Hint: See Activity 2.)
- 15 –2. What advantage is there in knowing about a pregnancy very early? (Hint: See Activity 3.)

★ 15–3. **Why is the presence of HCG in a woman a sure indication of pregnancy?**

In 1947, a quick, inexpensive, and simple test using male frogs was developed.



POS.

Positive sign (pregnancy): There are sperm in the frog's urine.

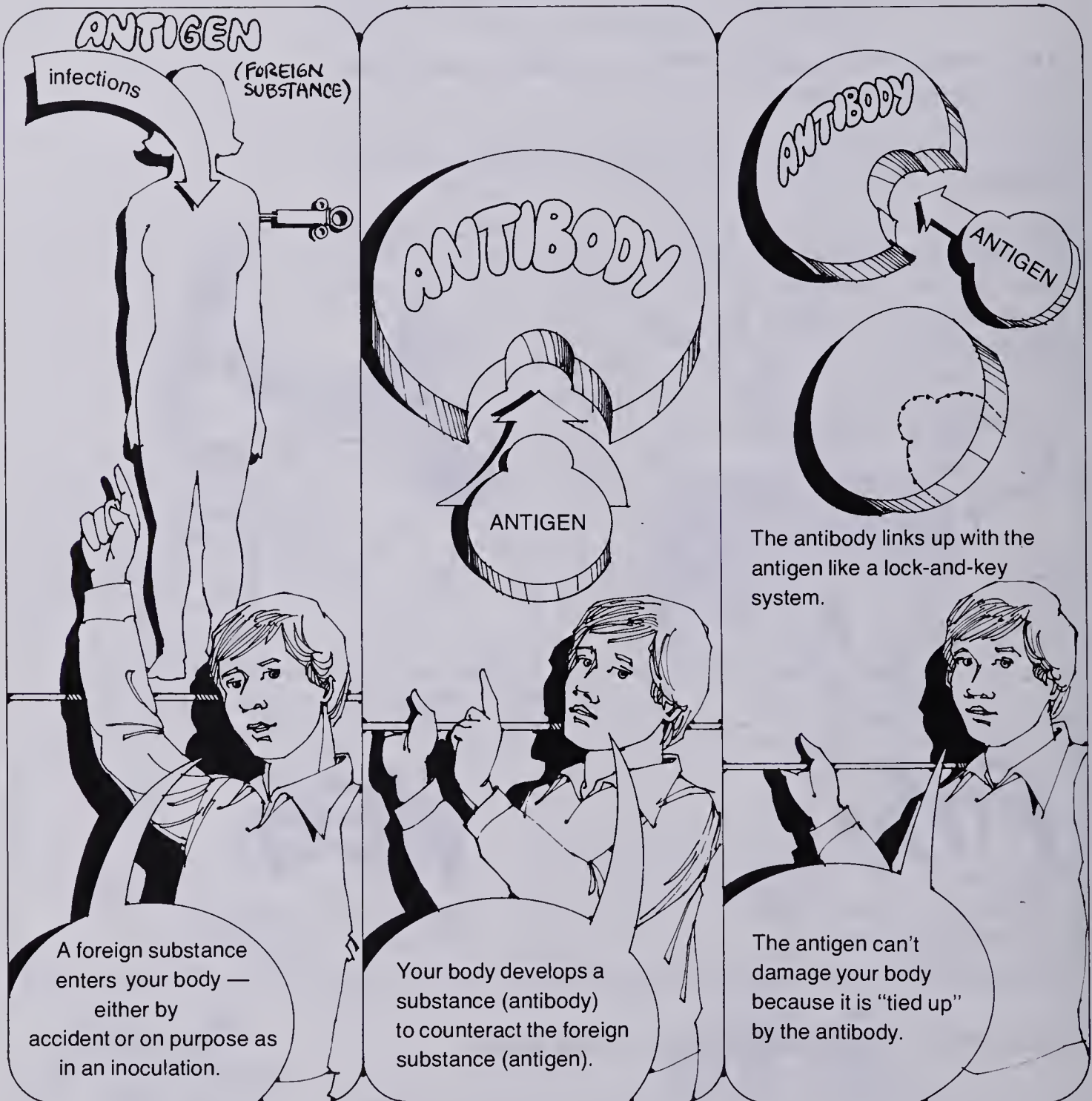
NEG.

Negative sign (no pregnancy): There are no sperm in the frog's urine.

★ 15–4. **What effect does HCG have on male frogs?**

A blood-cell agglutination test was developed in 1960, and since then several different tests similar to it have been developed. Blood-cell agglutination tests are fast, easy, usually accurate, and don't require killing test animals. These tests, therefore, are rapidly replacing the animal-urine tests.

A blood-cell agglutination test depends on the fact that HCG causes an antigen-antibody reaction. Here is how any antigen-antibody reaction works.

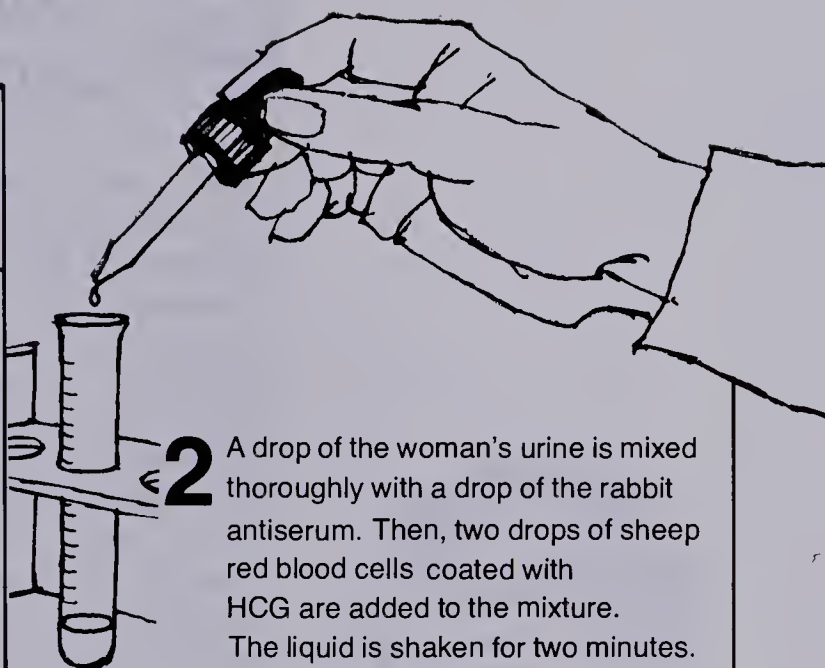


- 15 –5. What is an antibody? What is an antigen?
- 15 –6. Describe what an antibody does to the antigen.

In a blood-cell agglutination test, the HCG acts as an antigen. Here's how the test is done.



1 A rabbit is injected with HCG. The rabbit produces an antiserum containing antibodies that can link up with HCG. Some of this serum is then removed from the rabbit.



2 A drop of the woman's urine is mixed thoroughly with a drop of the rabbit antiserum. Then, two drops of sheep red blood cells coated with HCG are added to the mixture. The liquid is shaken for two minutes.

3 If the woman is *not* pregnant, there is no HCG in her urine.

Urine and antiserum do not have an antigen-antibody reaction.

But when

sheep red blood cells coated with HCG

are added,

THERE IS VISIBLE CLUMPING due to the antibodies of the serum combining with the HCG in the sheep blood.

4 If the woman *is* pregnant, her urine contains HCG.

Urine and antiserum have an antigen-antibody reaction that uses up the antibodies in the antiserum.

Then when

sheep red blood cells coated with HCG

are added,

THERE IS NO CLUMPING because the rabbit serum antibodies were used up by the HCG in the urine.

One of the new blood-cell agglutination tests uses latex particles coated with HCG instead of sheep blood cells.

- 15 –7. In the latex-particle pregnancy test, where is the antibody made? What antigen is the antibody for?

★ 15–8. **Why doesn't the urine of a pregnant woman cause clumping of the HCG-coated latex particles or of the HCG-coated sheep blood cells in blood agglutination pregnancy tests?**

- 15 –9. List two reasons why the newer pregnancy tests are replacing the older tests.



Activity 16

Stages of Mind Expansion

Human mental ability begins with the simple reflexes of babies and progresses gradually to the complicated logic of adult thinking. One explanation of the pathway to adult logic has been given by the Swiss psychologist Jean Piaget. As explained in Activity 11, Piaget's theory of mental growth includes different stages, or ways of thinking, that people pass through on their way to being able to think logically.

You can get some firsthand experiences similar to those Piaget had when he was developing his theory. To do this, you will give two tests to three people of different ages. Choose a preschooler (a child under five years old), an elementary school child (between six and twelve), and a teenager or older adult. To record your results, copy the chart in Figure 16-1, omitting the hand-written results and the lines inside the bottles. Have all the equipment for both tests ready before you start. (If you can't find one or more of the required persons to test, check with your teacher.)

Use Figure 16-1 to see the way your data should be collected. Of course, your subjects (the people you test) will give different answers, and you should record those.

DEVELOPMENTAL DATA

SUBJECT	TEST 1				TEST 2	
	More Red, Same, or More Black	Reason	More, Same, or Fewer	Reason	Waterline 1	Waterline 2
1	<i>more red</i>	<i>There's just more.</i>	<i>more black</i>	<i>The black line's longer.</i>		
2	<i>same</i>	<i>You didn't add any or take any away.</i>	<i>same</i>	<i>You could move them back and they'll be the same.</i>		
3						

Figure 16-1

As you give the tests, keep in mind that they do not measure how smart someone is. Very intelligent people answer questions in different ways. The tests can only tell the way someone thinks about the things you show them.

You should also remember that your results may have errors. Psychologists are very careful to give tests under ideal conditions. Since you won't be able to do that, some of your results may not accurately reflect the thoughts of your subjects.

For Test 1, you will need the following equipment:

- 8 black checkers
- 10 red checkers

Do not give any clues to your subjects as to whether any of their answers and reasons are correct. You are trying to find out what stages your subjects are in; you're not teaching them how to do something.

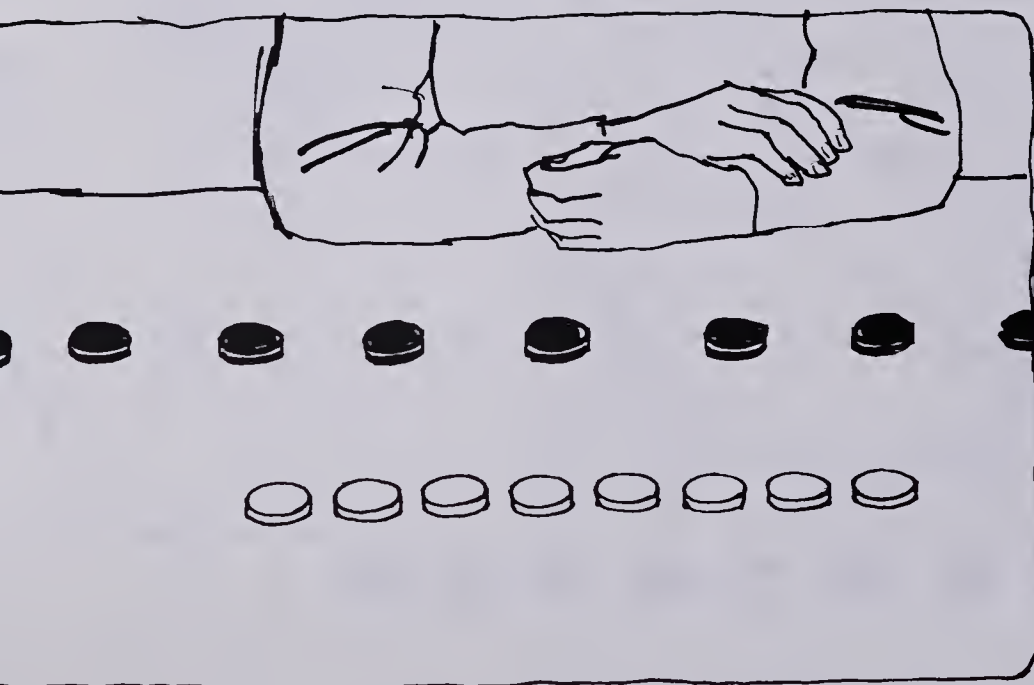
- A.** Put out eight black checkers in a row and give ten red checkers to your subject. Point below the black checkers and say, "Make a row of red checkers next to mine so that there is one red checker for each black checker."





B. If the person can't make a row like that, thank him or her and go on to Test 2 described on page 65. If the person does make a row, put away the two extra checkers and go on to Step C.

C. Now say, "I'm going to move my checkers like this." Then slide your black checkers together in a bunch, but not resting on top of each other. Do not move the red checkers. Say, "Are there more black checkers, more red checkers, or the same number of red and black checkers?" Record the answer in your chart. Then say, "Why do you think so?" Record the reason.



D. Say, "I'm going to move my checkers again." Then spread your black checkers out into a line about twice as long as the line of red checkers. Do not move the red checkers. Say, "Are there more black checkers, more red checkers, or the same number of red and black checkers?" Record the answer. Then say, "Why do you think so?" Record the reason. Thank your subject, put away the checkers, and go on to Test 2. Do not discuss the investigation with your subject.

You will need the following equipment for Test 2. Here again, don't tell your subjects whether their answers and reasons are correct.

2 identical stoppered or capped glass bottles, one empty and one half-full of colored water

pencil or pen

3 drawings, each of a pair of bottles (one tilted and one on its side as in Figure 16-1 but without lines), one drawing for each subject (make these drawings yourself)

A. Give your subject a drawing of the pair of bottles. Show your subject the bottle with the water in it sitting on the table. Show the empty bottle held up in a tipped position. Try to match its position with that shown in the drawing. Say, "On your paper, draw where the waterline (the top of the water) would be if the water in this bottle were in this empty one." (Do not pour the water, and remember not to tell your subjects whether their drawings are correct.)

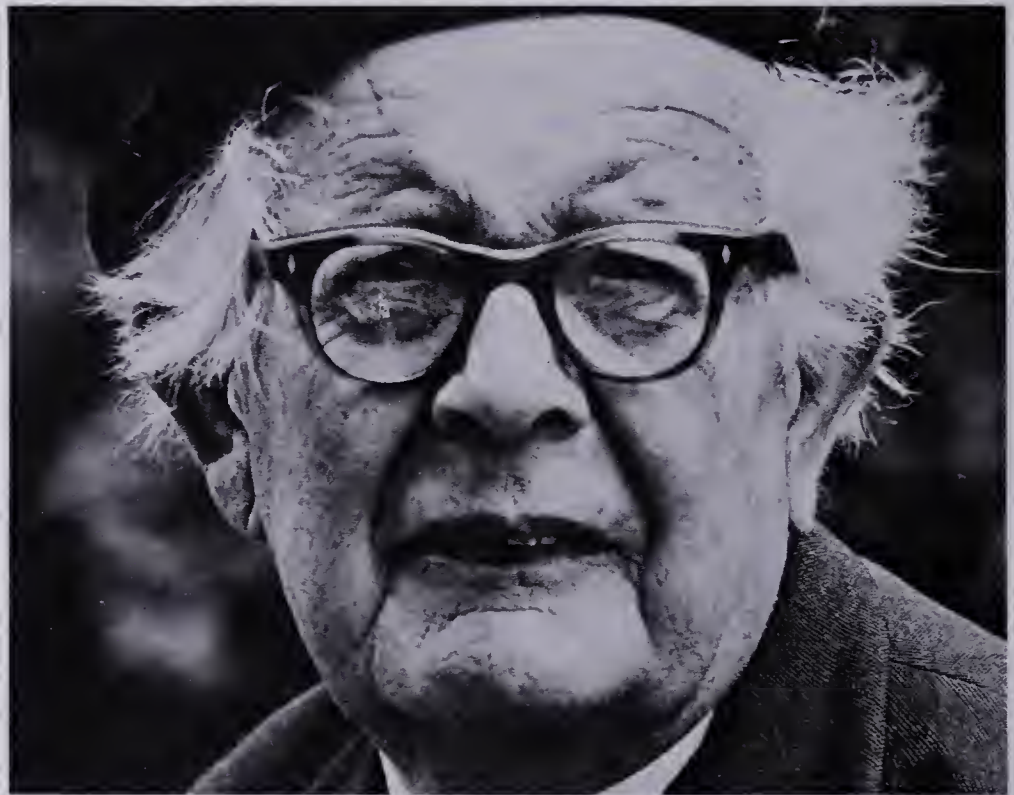
B. Then show the empty bottle lying on its side and say, "For the second bottle on your paper, draw where the waterline would be if the water in this bottle were in this empty one."

C. Make a record in your chart of where your subject draws the waterlines. Thank your subject and say that the tests are over.



Now take a look at Figure 16–1 (back on page 62) and the data you have gathered. Answer the following questions.

- 16 – 1. Which subject in Figure 16–1 illustrates the logical thinking of adults?
- 16 – 2. Did anyone you tested give all correct answers and logical reasons? If so, which subject was it?
- 16 – 3. Did anyone you tested give all incorrect responses? If so, which subject was it?
- 16 – 4. Did anyone you tested give a mixture of right and wrong, logical and illogical responses? If so, which subject was it?



Jean Piaget

These two tests and the responses people make to the questions can show you something about the kinds of thinking Piaget observed in people of different ages. Piaget put data like these and much, much more together to come up with his theory of intellectual development.

Piaget's theory can account for any differences you observed in the responses to your tests. Take a look at Figure 16–2. It's an extension of some of the information in Activity 11.

SUMMARY OF PIAGET'S THEORY OF INTELLECTUAL DEVELOPMENT

STAGE	NAME	APPROX. AGE (in years)	CHARACTERISTICS OF THE STAGE
1	sensori-motor	0-2	Uses reflexes (grasping, sucking, and so forth) present at birth and perceptions (things seen, smelled, heard, tasted, and felt) to begin to figure out how the world operates. Considers everything from own point of view ("self-centered"). Uses own actions as basis for thought. Begins development of memory of things in past and anticipation of things to happen in future.
2	preoperational	2-7	Begins to organize own behavior to achieve specific goal; for example, plans to climb up on a chair and stand up to get a cookie from the countertop. Cannot reverse thoughts; for example, may say that she has a sister named Joyce, but that Joyce does not have a sister. Cannot attend to all the variables at the same time, so pays attention to variables most easily perceived.
3	concrete operational	7-12	Gradually acquires ability to conserve number, weight, amount, area. <i>Conserve</i> means the person recognizes that the weight, amount, area, or number of a set of objects does not change when the objects are rearranged. Cannot consider abstract possibilities that have never been experienced.
4	formal operational	12+	Can think up theories about things that have never been personally experienced. Can mentally or physically test different explanations and then can predict outcomes without carrying out all possible physical experiments. Can figure out things logically.

Figure 16-2

Subject 1 in Figure 16–1 (page 62) thought that there were more red checkers in the first rearrangement and more black checkers in the second rearrangement. The subject noticed how long each line of checkers looked and answered the questions based on that perception.

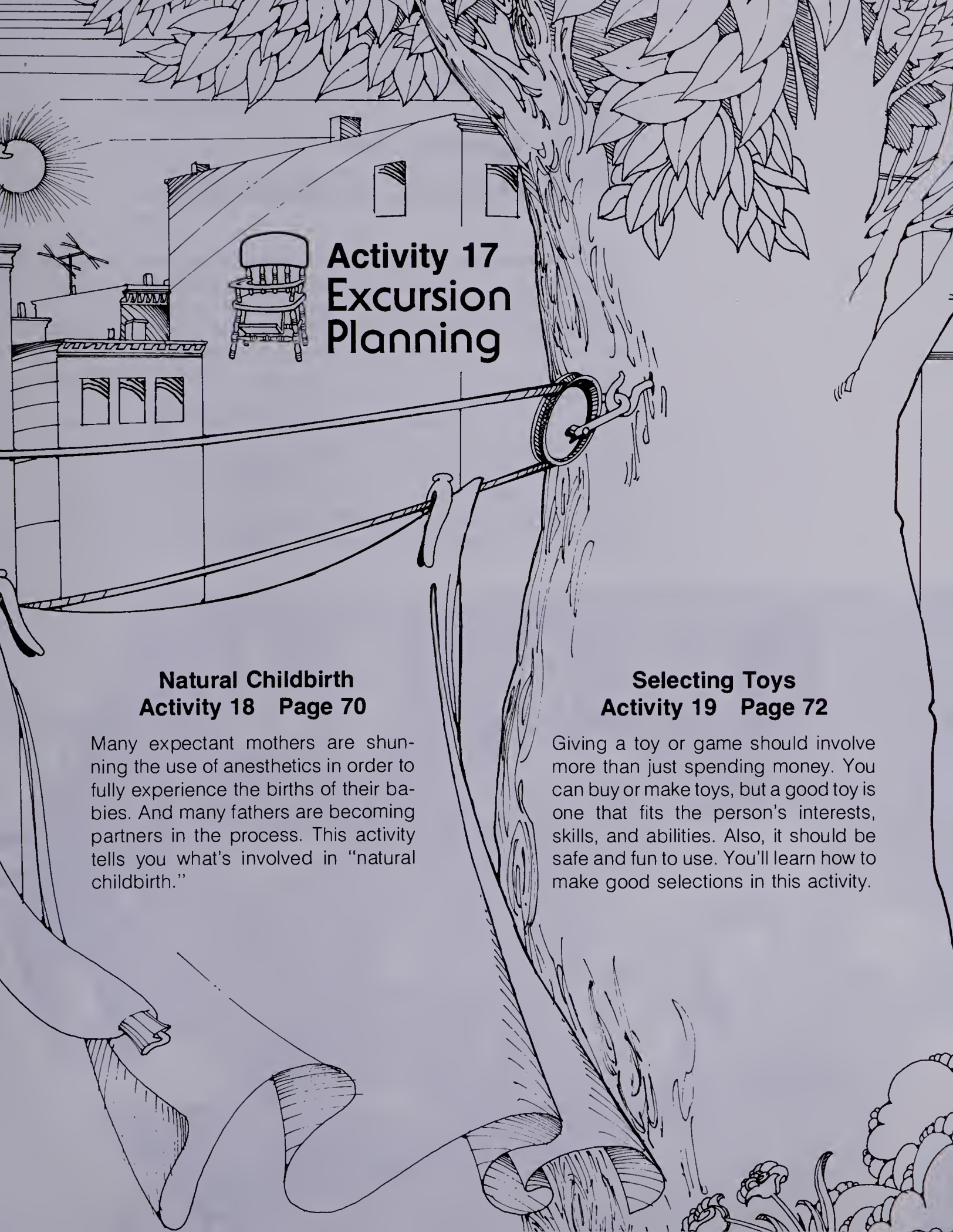
- 16 – 5. According to Figure 16–2 on page 67, in which of Piaget’s theoretical stages of intellectual development is Subject 1 (Figure 16–1)? In what age group would Subject 1 probably be?
- 16 – 6. Subject 2 (Figure 16–1) realized that the number of objects in a set remains the same if the set is just rearranged. According to Piaget’s theory, in what two stages of mental growth would that be characteristic?
- 16 – 7. Which of Piaget’s stages of intellectual development seemed to be shown by the three people that you tested yourself?
- ★ 16–8. **Write the letters *a* through *h* in your notebook. Complete the table in Figure 16–3 by putting Piaget’s stages of intellectual development in order of appearance and listing one characteristic of each stage.**

STAGES OF INTELLECTUAL DEVELOPMENT

ORDER OF APPEARANCE (1,2,3,4)	NAME OF STAGE	CHARACTERISTIC
(a)	preoperational	(e)
(b)	formal operational	(f)
(c)	sensorimotor	(g)
(d)	concrete operational	(h)

Figure 16–3

According to Piaget, your mental skills have developed gradually since your birth. At one time, you would have responded to these tests just as the preschool child did. But now your mental ability is much more advanced. Still you have not reached the limit of your mental growth.



Activity 17 Excursion Planning

Natural Childbirth Activity 18 Page 70

Many expectant mothers are shunning the use of anesthetics in order to fully experience the births of their babies. And many fathers are becoming partners in the process. This activity tells you what's involved in "natural childbirth."

Selecting Toys Activity 19 Page 72

Giving a toy or game should involve more than just spending money. You can buy or make toys, but a good toy is one that fits the person's interests, skills, and abilities. Also, it should be safe and fun to use. You'll learn how to make good selections in this activity.



Activity 18

Natural Childbirth

A normal, healthy woman can give birth without much use of painkillers and anesthetics — assuming there are no complications. This kind of prepared childbirth is commonly called *natural childbirth*.

Today many women are trying natural childbirth. Some are doing this to avoid the possible side effects of anesthetics. But many women who try natural childbirth do so because they want to fully experience childbirth.

There are many approaches to natural childbirth. But all methods include teaching the expectant mother about what to expect during birth. And all include techniques to reduce the pain in giving birth.

To learn about one method that is in common use, you will need a cassette player and the tape for *Birth and Growth*. Find the band for Activity 18 and begin listening when you are ready.



★ 18-1. **Why is education about childbirth important for expectant mothers?**

- 18-2. What is assumed to be the cause of pain in labor?

★ 18-3. **During natural childbirth, what is done to reduce pain in labor?**

- 18-4. What claim is made about the physical effects on the mother who experiences natural childbirth?
- 18-5. What claims are made for the emotional benefits of natural childbirth?
- 18-6. What psychological training technique is used in the method described on the tape?
- 18-7. What is the father's role in the natural childbirth method described on the tape?
- 18-8. What is the function of controlled breathing in the natural childbirth method described on the tape?





Activity 19 Selecting Toys

Pretend that you are the aunt or uncle of five children. Birthdays are coming, and you always give a game or toy. Your nieces and nephews are ages ten months and two, five, eight, and thirteen years. Consider what you will give each one and why.



You should consider the physical and mental abilities of each child. Think about how well each one can handle objects, use language (speak and read), and reason. Also consider what you know about the appeal, safety, educational value, and sturdiness of each toy and game.

- 19–1. Use the information in Figure 19–1 to select two toys for each child. Select the toys from those shown on pages 74, 75, and 76. Assume you can afford to buy all the toys. (You may want to review Activities 11 and 12 for help.)

STAGES OF DEVELOPMENT

AGE	STAGE OF MUSCLE COORDINATION	STAGE OF LANGUAGE DEVELOPMENT	STAGE OF MENTAL DEVELOPMENT ACCORDING TO PIAGET
10 months	can crawl and sit; can hold objects	babbling; can say "mama"	Stage 1
2 years	can walk and run; can feed self	can say several words, not sentences; can't read	Stage 1
5 years	can dress self; can ride tricycle; can brush teeth	can say sentences; can recognize letters; can't read; likes to look at books	Stage 2
8 years	can ride bicycle; can skate	can read some books; doesn't know most long words	Stage 3
13 years	can do any physical activity after learning and practice	can read most books	Stage 4

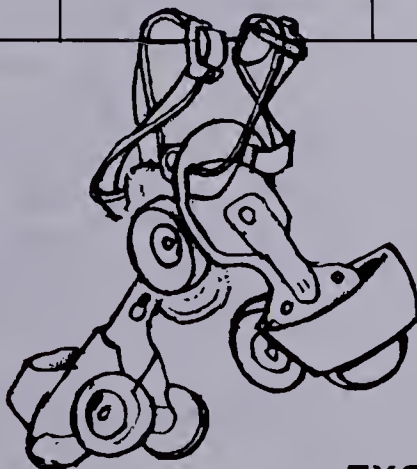
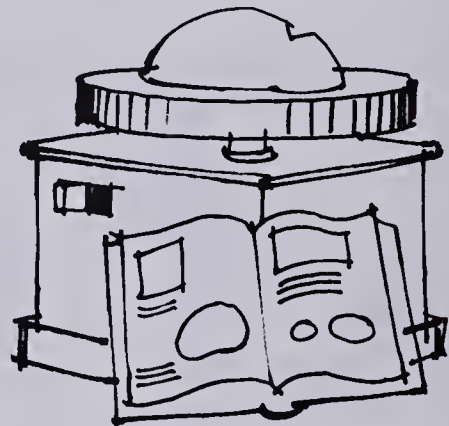


Figure 19–1

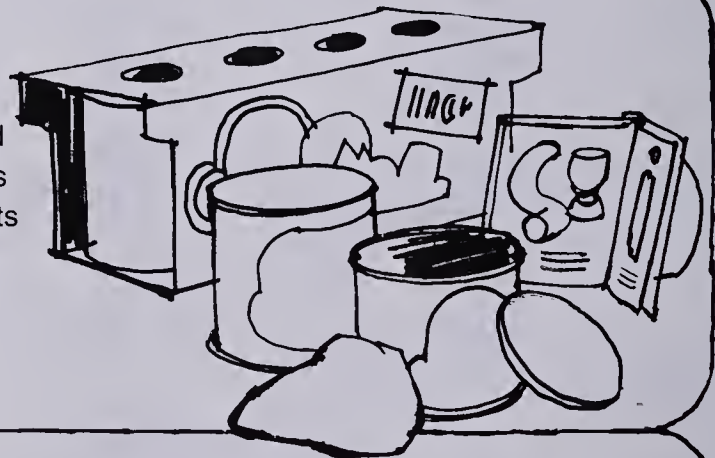
Bath toy of soft, nonpoisonous plastic squeeks when squeezed.



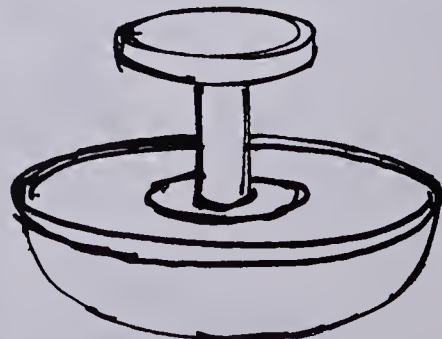
Pottery wheel, turned by an electric motor, has instruction booklet that tells the kind of clay to use and how to make and finish items.



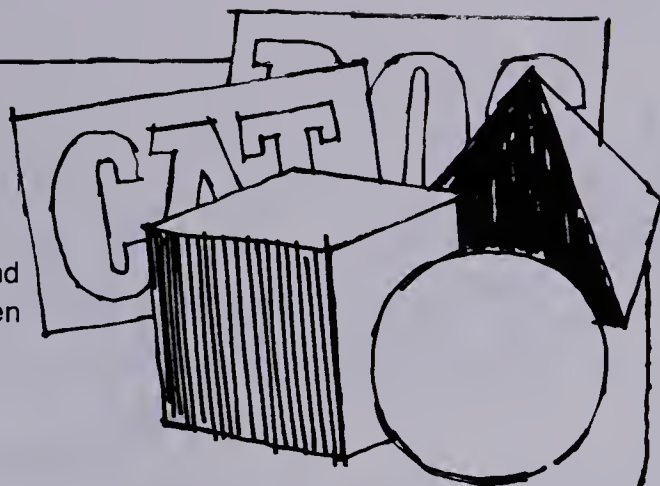
Modeling clay, nonpoisonous and nonhardening, has drawings of objects that children can make.



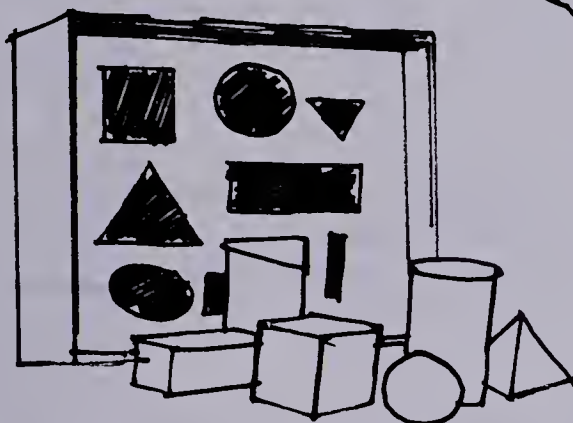
Sit-on top for child to sit on and spin around without danger of breaking, upsetting, or pinching fingers.



Beginners game uses knowledge of colors and shapes to teach children some simple words.



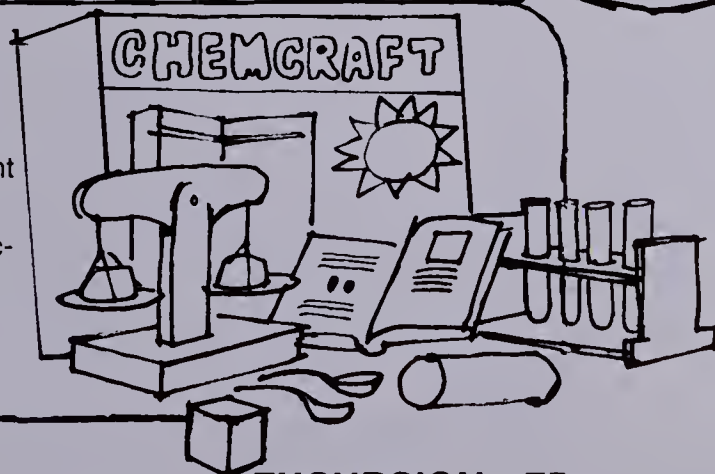
Shape game with movable parts sealed inside, rings a bell when a block is put into the correct hole.



Tricycle with no sharp edges, chains, or spokes has wide molded tires that make it difficult to upset.



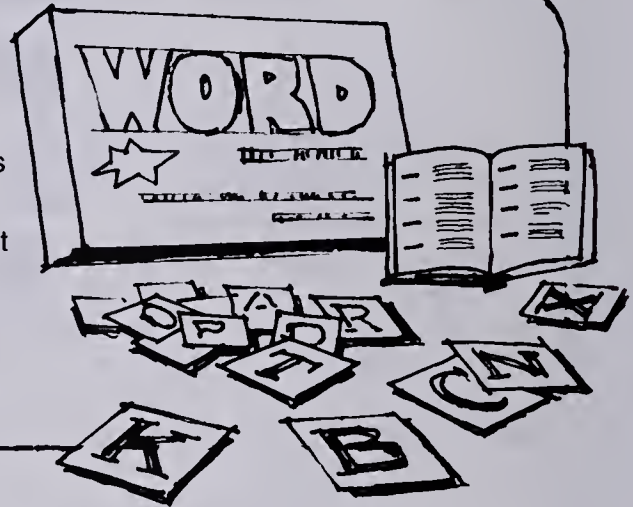
Chemistry set with 30 different chemicals, alcohol burner, chemical balance, and instructions for simple experiments.



Wheel of soft, clear, nonpoisonous plastic has colored balls that roll around as the wheel is turned.



Junior word game with letters for forming simple words and sentences has a word list that includes definitions.



- ★ 19-2. List two reasons why you should not give a young child a toy that is meant for an older child.
- ★ 19-3. List at least three things you should consider when selecting a toy for a child.

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